MODERNIZING THE AVIATION SYSTEM: LEVERAGING THE ASSETS OF THE FAA'S WILLIAM J. HUGHES TECHNICAL CENTER

(113–58)

FIELD HEARING

BEFORE THE

SUBCOMMITTEE ON
AVIATION

OF THE

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE HOUSE OF REPRESENTATIVES

ONE HUNDRED THIRTEENTH CONGRESS

SECOND SESSION

MARCH 11, 2014 (Egg Harbor Township, New Jersey)

Printed for the use of the
Committee on Transportation and Infrastructure

Available online at: http://www.gpo.gov/fdsys/browse/committee.action?chamber=house&committee=transportation

U.S. GOVERNMENT PRINTING OFFICE

87–048 PDF WASHINGTON : 2014

For sale by the Superintendent of Documents, U.S. Government Printing Office
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March 7, 2014

SUMMARY OF SUBJECT MATTER

TO:	Members, Subcommittee on Aviation
FROM:	Staff, Subcommittee on Aviation
RE:	Subcommittee Field Hearing on "Modernizing the Aviation System: Leveraging the Assets of the FAA's William J. Hughes Technical Center"

PURPOSE

The Subcommittee on Aviation will meet on Tuesday, March 11, 2014, at 1:30 p.m. at the Federal Aviation Administration's (FAA) William J. Hughes Technical Center (Technical Center) located at the Atlantic City International Airport (ACY) in Egg Harbor Township, New Jersey. The Subcommittee will receive testimony from the FAA and industry experts to learn about the resources of the Technical Center and how they can best be utilized to move NextGen forward. As part of the transition to NextGen, the FAA must safely integrate unmanned aircraft systems (UAS) into the national airspace system; therefore the Subcommittee will also receive testimony on that subject.

BACKGROUND

History and Overview of the William J. Hughes Technical Center

On July 1, 1958, the Federal Airways Modernization Board established the National Aviation Facilities Experimental Center (NAFEC) near Atlantic City, New Jersey. On May 29, 1980, the FAA changed the name from NAFEC to the FAA Technical Center, and on May 6, 1996, it was renamed the William J. Hughes Technical Center.[1]

The Technical Center serves as the core FAA research and development facility for modernizing our air traffic control (ATC) system, including the Next Generation Air

[1] http://www.faa.gov/about/office_org/headquarters_offices/ang/offices/tc/history/

Transportation System (NextGen), and for advancing programs to enhance aviation safety. In addition to research and development work, the Technical Center provides continuous operational support to the FAA's field facilities across the country. Further, the Technical Center houses several laboratories, such as air traffic control and simulation facilities, the world's largest full-scale aviation fire test facility, the National Airport Pavement Test Facility, and a fleet of specially-instrumented in-flight testing aircraft.[2]

With respect to the areas of ATC modernization and aviation safety work, the Technical Center has a long track record of demonstrated expertise. The Technical Center was involved in some of the earliest ATC projects, including ATC automation, the first operational testing of an en route[3] system, and the first ATC tower cab mockup to test controller work areas and do airport observations. More recently, the Technical Center was instrumental in the research and development of major NextGen programs, including En Route Automation Modernization (ERAM), Terminal Area Modernization Automation, Data Communications, and Automatic Dependent Surveillance-Broadcast, and it continues to play an integral role in their testing and validation.

NextGen

More than a decade ago, Congress, the federal government, and aviation industry stakeholders began working on a program to transform our World War II-era ATC system into a modern air traffic management system capable of meeting future air traffic demands. Government and aviation industry leaders recognized that without modernizing our ATC system, the United States would be hard-pressed to remain global leaders in aviation. The concept was simple: create a more efficient, reliable, safe, and environmentally-friendly air transportation using 21st Century technologies.

While the FAA has made progress in its efforts to implement NextGen, the agency has experienced several setbacks, including cost overruns and delays to foundational programs. These setbacks are documented in detail in reports published by the Department of Transportation, Office of Inspector General, and the Government Accountability Office, Comptroller General. Both the Inspector General and Comptroller General have highlighted issues such as a failure to involve and receive input from all stakeholders (such as air traffic controllers) and technical issues with modernization projects that are needed to implement NextGen capabilities and deliver benefits to users.

Given the significance of a successful NextGen program, it is important that government and industry stakeholders are using every available resource, such as the world-class laboratories and resources of the William J. Hughes Technical Center, to identify problems and develop solutions.

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[2] Id.

[3] *Air Route Traffic Control Centers* control aircraft in high-altitude en route airspace (i.e., in transit and during approach to some airports, generally controlling the airspace around and above terminal areas).

NextGen Integration and Evaluation Capability

The Technical Center houses the NextGen Integration and Evaluation Capability (NIEC), which is the FAA's research platform to explore, integrate, and evaluate NextGen concepts through simulation activities. The NIEC leverages existing NAS operational systems to create an environment that can be tailored for NextGen research as well as test and evaluation. It also has the ability to provide a combined environment of legacy systems with NextGen technologies and capabilities, enabling the NIEC to support the transition to NextGen.[4]

The NIEC contains an air traffic suite, a research cockpit simulator, an unmanned aircraft system suite, a simulated tower, and a multi-purpose area. The multi-purpose area can be used to display weather and traffic management data, operate as a simulation monitoring station, or simulate an airline operations center. These assets can also be configured to replicate a desired traffic scenario, address emergent research questions, and develop solutions for problems identified in the field.

For example, when ERAM – a major NextGen enabling software program – was being deployed in en route air traffic facilities, several site-specific problems were discovered. These problems were relayed to the Technical Center where teams of FAA and industry professionals would assemble and use the NIEC to troubleshoot in a simulated environment. When solutions were developed, they were transmitted back to the originating facility and implemented.

UAS

The safe integration of unmanned aircraft systems into the national airspace system presents significant challenges. The *FAA Modernization and Reform Act*[5] required the FAA to establish six test ranges[6] to address these issues. Each test range is intended to be unique and, their operation will be focused on specific research and development areas, such as developing certification standards for UAS categories, integrating UAS with NextGen technologies, and testing, identifying, and evaluating operational and technical risks.

Once operational, the test ranges will collect an enormous amount of data that will ultimately be used to safely integrate UAS into the NAS. However, the data must first be analyzed and validated by the FAA. The Technical Center is expected to lead this effort.

Role of the Technical Center

The Technical Center is well-equipped to assist the FAA in meeting the challenges of modernizing our ATC system. It is supported by roughly 1,500 FAA employees and 1,500 FAA contractors and houses a unique network of aviation laboratories. This hearing will examine the Technical Center's historical and ongoing role in the development and progression of NextGen,

[4] FAA Handout, NextGen Integration and Evaluation Capability
[5] P.L. 112-95
[6] The FAA announced the selection of the test ranges on December 30, 2013. They include the University of Alaska; State of Nevada; New York Griffiss International Airport; North Dakota Department of Commerce; Texas A&M University-Corpus Christi, and; Virginia Polytechnic Institute and State University.

as well as highlight potentially underutilized resources and identify additional ways the Technical Center can help improve the implementation of NextGen and the safe integration of UAS.

WITNESS LIST

Panel I

The Honorable Michael Whitaker
Deputy Administrator and Chief NextGen Officer
Federal Aviation Administration

Mr. Dennis Filler
Director
William J. Hughes Technical Center
Federal Aviation Administration

Panel II

Ms. Cynthia Castillo
President and CEO
CSSI, Inc.

Mr. Melvin Davis
National Representative for NextGen
National Air Traffic Controllers Association

Mr. Pete Dumont
President and CEO
Air Traffic Control Association

Mr. Ben Gielow
General Counsel and Senior Government Relations Manager
Association for Unmanned Vehicle Systems International

MODERNIZING THE AVIATION SYSTEM: LEVERAGING THE ASSETS OF THE FAA'S WILLIAM J. HUGHES TECHNICAL CENTER

TUESDAY, MARCH 11, 2014

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON AVIATION,
COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE,
Egg Harbor Township, NJ.

The subcommittee met, pursuant to call, at 1:30 p.m., in William J. Hughes Technical Center, Hon. Frank A. LoBiondo (Chairman of the subcommittee) presiding.

Mr. LOBIONDO. The subcommittee will now come to order.

I would like to thank everyone for being here today.

Let me start off by saying how Rick and I and the subcommittee, our thoughts and prayers are with the families of the missing Malaysian Airlines flight. I know we are all anxiously awaiting to hear what happened there, and at this point all we can say is our thoughts and prayers are with them.

Again, let me begin by thanking everyone for being here today and everyone that helped organize this hearing. The FAA has been a great host and I really appreciate all of their efforts to accommodate us.

I also want to thank the ranking member, Rick Larsen from the State of Washington, for taking time out of his day to see firsthand. We had a tour this morning. I think it was your first time here, Rick, and got a good opportunity to see why we are the premier facility in the entire United States of America—in fact, the world—for safety and security and research and development. Our laboratories are one of a kind, but as great as the laboratories are, it is the men and women who work here at the Technical Center who make all of this go. The dedication, the enthusiasm, the commitment to excellence is deeply appreciated, and we want to personally acknowledge you for that.

I want to also welcome our witnesses today. We look forward to your testimony.

I have been very fortunate to represent the Technical Center during my time in Congress. While I have not always been chairman of the Aviation Subcommittee, I have always been the biggest cheerleader and a huge supporter for the work that is done here, and I believe the work that goes on here will make such a tremendous difference to our aviation system and the country.

One example of this is the work that was done here at the Technical Center on the Asiana crash, which was last July, July of

2013. While the loss of any life is tragic, it could have been much worse if the improvements and the safety developments that had been worked on here were not implemented into that flight.

The Technical Center houses the world's largest aviation test facility. Work here has produced safety improvements, including again the most recent aviation slides, fuel tank explosion protection, fire blocking layers in seat cushions. These efforts reduce the likelihood of a fire on board an aircraft, and, should one occur, slow the spread of fire, giving passengers more time to evacuate an aircraft, and ultimately save lives.

While I could go on for quite a while talking about the wide range of important work that goes on here, today's hearing is focused on the Technical Center's role in the development and implementation of the FAA's air traffic control modernization program, known as NextGen. The goal is to ensure the Technical Center's resources and expertise are being used in a way that makes the most sense.

The Technical Center serves as the core FAA research and development facility for NextGen. Looking back, the Technical Center has been involved in some of the earliest air traffic control projects, including the design and development of the early Air Traffic Control Automation Systems and the first air traffic control tower cab mockup to validate controller work areas. These projects served as the foundation for our existing system.

And today, the Technical Center continues to play an integral role in the development, testing, and validation of the latest and greatest technologies. This includes programs such as satellite navigation, text-message-like data communications, and the enabling software to process NextGen technologies and capabilities. These programs are essential to NextGen, and the testing and validation work that is being done right here at this facility is unmatched anywhere.

Further, the Technical Center's role isn't over once the new system is deployed in the field. For example, when the En Route Automation Modernization, called ERAM, software experienced site-specific problems as it was being installed in FAA facilities, the problems were relayed to the Technical Center. Here Government and industry teams were able to troubleshoot the problem in a simulated environment, develop a solution, and transmit the solution back to the air traffic facility for implementation.

The ability to conduct that type of work is only possible because of the integrated laboratories here at the Technical Center. One of the key laboratories is the NextGen Integration and Evaluation Capability. Among its many functions, it has the ability to provide a combined environment of legacy systems with future technologies and capabilities, enabling it to support the transition to NextGen. Given the considerable challenges with the ongoing transition to NextGen, we must examine every available resource here at the Technical Center and ensure they are being adequately utilized, especially the world-class expertise of the Technical Center employees.

Finally, as part of the transition to NextGen, the FAA, in partnership with industry stakeholders, must also safely integrate unmanned aircraft systems or UAS into the National Airspace Sys-

tem. The Technical Center currently leads the FAA's Safety Research and Development Program. Through this program the Technical Center continually works with the FAA's regulatory organization to increase safety and allow for new technologies and ideas, including UAS. And as the committee saw earlier on the tour of the NIEC laboratories, the Technical Center has already flown UAS using simulation in the National Airspace System.

The FAA Technical Center will have a key role in helping collect, protect, analyze, integrate and validate operational and safety data that will become available from the six UAS test ranges established by the FAA. This data, along with the other work, is essential for the FAA to develop the regulatory program to allow for the safe UAS operations in the National Airspace System. We need to make sure that the Technical Center has what it needs for that important work.

I want to just take a moment to say also that we are all pretty proud here in New Jersey of the Technical Center for being named one of the six national test sites. There was sort of a nationwide RFP that was put out. This was a recognition that the technology is tremendous with the UAS systems. The application for everyday and quality-of-life issues is enormous. But the ability to safely integrate them into our airspace with the proper privacy restraints that are put on there is something that we look forward to.

And being one of only six in the entire United States of America, where the New Jersey application, along with Virginia, has made it to that final stage is something that we can all be pretty proud of, and I think holds a great opportunity.

With that, I would like to quickly introduce today's witnesses. Our first panel we have the Honorable Michael Whitaker, the FAA's Deputy Administrator and Chief NextGen Officer; and Mr. Dennis Filler, director of the Technical Center and the head of research and development.

On our second panel we have Mr. Pete Dumont, president and CEO of the Air Traffic Control Association and cochair of the NextGen Institute's Management Council; Ms. Cynthia Castillo, president and CEO of CSSI, Inc.; Melvin Davis, national representative for the NextGen National Air Traffic Controllers Association; and Mr. Ben Gielow, general counsel and senior government relations manager for the Association for Unmanned Vehicle Systems International.

On behalf of the subcommittee, we welcome you. We thank you in advance for your testimony. We certainly look forward to hearing from each of you and your perspectives on the Technical Center and NextGen and UAS-related resources, as well as your vision for what the Technical Center's role might look like into the years ahead.

I now ask unanimous consent that all Members have 5 legislative days to revise and extend their remarks and include extraneous materials for the record.

Without objection, that is so ordered.

And now I would like to turn to our ranking member, Mr. Rick Larsen.

Rick, thanks again for being here today.

Mr. LARSEN. Thanks, Frank. I appreciate it.

I want to thank Chairman LoBiondo for calling today's hearing to discuss modernizing the aviation system, leveraging the assets of the FAA's William J. Hughes Technical Center.

It is a pleasure to be here today and to tour this world-class facility and meet some world-class people involved in the research.

Over the past year that Frank and I have led the subcommittee, I have learned a lot through the hearings and in the listening sessions. Frank has done a great job of organizing the work of the subcommittee to be sure that the subcommittee itself is on the cutting edge of trying to figure out where the FAA and where the national airspace and where the aviation system and industry needs to go. I really appreciate his leadership.

Getting to see some of this new technology today has helped me better understand the rapidly evolving landscape for the aviation industry. And for those who don't know my district, if you fly in an airplane, it is probably built in my district, to give you a flavor of where I come from. There are 200 aerospace, other aerospace suppliers in my district, and in Washington State there are over 1,000 other aerospace suppliers, all operating and working not just because of an active aviation industry worldwide but because of a lot of the foundational work that takes place in research and development here at the Technical Center.

So our time here today highlights the ongoing need for a well-trained workforce that understands the complexities of our air system, and the center is a unique place for innovation to advance aviation technology, everything from hardware and software that you need to get information out to people so they understand what the weather is going to be like sooner, to the guys over in the fire system who get to blow things up, which is pretty cool as well.

For over 50 years, the Technical Center has served as a primary FAA research and development facility to enhance aviation safety and modernize the Nation's air traffic control system. Most recently, the Technical Center has been a cornerstone for the FAA in research and development of major NextGen programs like Automatic Dependent Surveillance, Broadcast and Data Communications, both of which we saw this morning.

While the implementation of NextGen has been long and challenging, the FAA has made progress, in part because of the ongoing work here at the center. The next big challenge facing the FAA is ensuring the safe integration of unmanned aircraft systems, or UAS, into one of the most complex air traffic systems in the world, and the FAA Modernization and Reform Act of 2012 set forth requirements and milestones for the FAA to integrate UAS into the national airspace. One of the Act's provisions required the FAA to select six test ranges. These sites are located throughout the country and will begin soon collecting safety and operational data.

Test site data will assist the agency in developing policies for future commercial and civil use of unmanned aircraft. So today, as part of the hearing, I certainly want to hear how the FAA intends to work with test sites to ensure that it is able to collect, protect, and share the data that it needs. I am also interested to hear how the agency will ensure privacy near the test sites.

Unfortunately, the Technical Center can't provide the FAA with the assets to collect, validate, and analyze all of the data it intends

to gather. So I hope to hear more about how the FAA intends to use its resources here as well to help advance the integration of UAS and to advance next-generation air traffic control.

So I want to thank Chairman LoBiondo again for having me up here and having me as a partner on the committee. I really appreciate it very much and look forward to hearing from our witnesses today. Thank you.

Mr. LOBIONDO. Thank you, Rick, very much.

Now I would like to recognize our first witness of the day, FAA Deputy Administrator and Chief NextGen Officer, Mr. Michael Whitaker.

Michael, thank you.

TESTIMONY OF HON. MICHAEL G. WHITAKER, DEPUTY ADMINISTRATOR AND CHIEF NEXTGEN OFFICER, FEDERAL AVIATION ADMINISTRATION; DENNIS FILLER, DIRECTOR, WILLIAM J. HUGHES TECHNICAL CENTER, FEDERAL AVIATION ADMINISTRATION

Mr. WHITAKER. Thank you. Good afternoon, Chairman LoBiondo, Ranking Member Larsen, members of the subcommittee. Thank you for the opportunity to testify today.

Before we begin, I would also like to take a moment on behalf of the agency to say that our hearts go out to the families of those on Malaysian Air flight 370. On Saturday, the FAA sent representatives as part of the NTSB investigative team supporting the Malaysian Government with the accident investigation. The United States Government is in communication across agencies and with international officials to provide any additional assistance that may be necessary.

Turning to the matter at hand, to the Technical Center, I am pleased to have the opportunity to highlight this facility's vital role in deploying NextGen and in integrating unmanned aircraft into our Nation's airspace.

Let me start by noting that we are nearly complete with the foundation of NextGen. This foundation includes a much needed upgrade of the automation in our air traffic control facilities and building of ground stations to enable the transition from a radar-based to a satellite-based system.

Right now, 18 of our 20 en route centers have started running ERAM to control traffic in high-altitude airspace. More than half are using it exclusively to control air traffic instead of the legacy system from the 1960s. All 20 en route centers are expected to be running ERAM exclusively by March of next year, which will allow us to pull down the legacy host system.

We are also upgrading the computer system that runs the lower altitude airspace closer to airports. This project, TAMR, requires switching out computer processors, screens and software in more than 150 TRACON facilities across the country.

Throughout the United States, we have installed more than 95 percent of the ground stations for ADS–B, and we will complete the baseline installation this month. With this technology we will achieve more precise surveillance of aircraft, which will make the air traffic system safer and more efficient.

In addition to this foundation, we continue to implement performance-based navigation procedures. PBN allows aircraft to fly on more direct paths across the country and in congested airspace. These advanced navigation procedures are cutting flight time and reducing fuel burn and emissions.

This is all good progress, but it is just the beginning. Completing NextGen's foundation will enable new capabilities that will make aviation safer, more efficient, and more environmentally friendly.

NextGen technologies are also making it possible to safely introduce unmanned aircraft into the airspace system, and let me give you a few examples of the connection between NextGen and unmanned aircraft systems.

In order for many unmanned aircraft to operate safely in shared airspace, we must develop technologies that enable them to detect and avoid other airborne vehicles. The agency is researching and developing a collision avoidance system specifically designed for unmanned aircraft. It is a technology called ACAS X–U. The Technical Center will also be aiding this effort by conducting flight testing, as we saw this morning.

Also, ADS–B can help achieve collision avoidance through more precise surveillance and separation of both manned and unmanned aircraft in the same vicinity.

Another NextGen technology that will support unmanned aircraft is NAS Voice System. NVS modernizes the voice communication capabilities that we use for air traffic services. It will enable controllers to communicate with the ground pilot of an unmanned vehicle even if that pilot is located on the other side of the country.

With its world-class laboratories and engineering expertise, the FAA's Technical Center plays a central role both in the deployment of NextGen and in the safe introduction of unmanned aircraft. As you mentioned, this past December we announced the selection of six test sites for unmanned aircraft across the country. These test sites, which include State governments and public universities, will provide data to help us determine the safety certification and navigation requirements for unmanned systems. We expect that a significant portion of the test site data collection and analysis will take place at the Technical Center.

Later this year we will also be conducting simulation modeling for the Department of Defense to assist them in standardizing procedures for unmanned aircraft across various branches of the military. The FAA is working with other Government agencies, including NASA and the Department of Homeland Security, on unmanned aircraft projects. By working with other agencies here at the Technical Center, we are able to leverage each other's expertise and resources and minimize the duplication of efforts.

Let me close by saying that NextGen is already delivering benefits across the country. We have made great progress toward completing the foundation of NextGen and we are well positioned to reap more benefits in air traffic efficiency, reduce delays, fuel savings, and environmental improvements. The Technical Center is enabling us to realize these benefits and enabling us to safely introduce unmanned aircraft.

Mr. Chairman, that concludes my remarks, and I would be happy to take any questions.

Mr. LOBIONDO. Thank you, Mr. Whitaker.

Now I would like to recognize the head of research and development for the FAA and the director of the Technical Center, Dennis Filler.

Dennis, the floor is yours.

Mr. FILLER. Thank you, sir. Good afternoon, Chairman LoBiondo and Ranking Member Larsen. Thank you very much for the opportunity to testify before you today.

As the director of the FAA William J. Hughes Technical Center, please let me extend a warm welcome to you. It is certainly an honor to have you here with us.

The Technical Center is the Nation's premier air transportation systems laboratory. We support the development of scientific solutions to both current and future air transportation system challenges. We utilize our one-of-a-kind, world-class laboratory and its environments to enable the modernization and sustainment of the National Airspace System.

There is no facility like this anywhere in the world, replicating the entire national airspace under one roof with the capability to support all aviation systems throughout their complete life cycle.

The center's areas of focus include safety, air traffic management, communications, navigation, surveillance, aeronautical information, weather, human factors, flight test, information systems security, and airport technologies. The center also provides 24/7 operational support to FAA field facilities across the Nation. Center specialists diagnose and correct problems so that critical systems can remain operational. Our efforts have an impact all across the world.

As the Deputy Administrator stated, the center plays a central role in both the deployment of NextGen and in the safe integration of unmanned aviation systems into our Nation's airspace.

Key NextGen foundational programs such as ADS–B, ERAM, and datacom have all been developed, tested, or began their nationwide deployment from the Technical Center through our unique engineering, our test and evaluation, and sustainment activities. You have had the chance to see some of these technologies in action this morning.

The center will continue to be a key player in unmanned aircraft systems, supporting concept exploration, research and development, and ultimately full integration and systems testing. The center replicates the entire NAS by having all the equipment and the support systems that exist in the NAS. In addition, we have the ability to simulate or emulate any geographic location or set of operating conditions. As a result, it uniquely positions us to be able to support exploration of unmanned aircraft systems integration.

Key NextGen technologies developed right here will enable the safe integration of unmanned aircraft systems into our National Airspace System. These systems and other transformational programs have the potential to provide UAS, as well as manned aircraft, more information, flexibility, situational awareness, and a greater ability to communicate vital information between all users of the National Airspace System.

Beyond NextGen and unmanned aircraft systems, other critical safety systems are developed here, including our flame-resistant

aircraft seats and interior panels which you saw this morning, and approved floor and exit lightings, and the standards to which all these products are designed and built.

The implementation of these standards permitted the passengers of Asiana Airlines flight 214 the critical time that they needed to safely exit the aircraft. Thanks in large part to the contributions of Technical Center research, almost everyone survived that crash.

In addition, we developed and fielded a crushable concrete arresting system that provides a way to quickly and safely stop an aircraft as large as a 747 in the event the plane runs off the end of the runway. Also, we are currently involved in research to make it safer to transport lithium batteries.

The Technical Center also serves as home base for other aviation-related entities. It is the home of the Federal Air Marshall Service Training Program and the Department of Homeland Security's Transportation Security Laboratory. Also located here are a U.S. Coast Guard aviation detachment and the New Jersey Air National Guard, as well as the Atlantic City International Airport. These aviation-related entities help create a collaborative aviation-centered campus that provides a real-world operational environment in which to explore future aviation concepts.

Mr. Chairman, once again, I would like to thank you for the opportunity to testify before you today. At this time, I would be happy to answer any questions you may have. Thank you.

Mr. LOBIONDO. Thank you.

We will start, Mr. Whitaker, with you.

With unmanned aerial systems, we know that the Technical Center is going to be very involved. Can you tell us briefly how the Technical Center will be involved with the safe integration into the National Airspace System? And what role will the Technical Center have with the six new congressionally mandated UAS test ranges?

Mr. WHITAKER. The Technical Center has been involved to this point and I think will continue to be involved as really the hub of the research that is going on around UAS. The Technical Center was involved in administrating the process around selecting the test sites, working with the test sites on contracting, and will serve as the hub for analyzing data that comes from the research that comes out of the test sites.

There are a number of technologies that we need to understand, sense and avoid being one of the key ones. Communications are also a key element since the pilot is not with the aircraft in that situation. All of those systems will also be tested here and integrated here. I would view the test center as really the hub of the technical effort to integrate the UAS into the system.

Mr. LOBIONDO. Mr. Filler, what would you say would be the top five priorities for the Technical Center in 2014? Top three?

Mr. FILLER. OK, sir. Thank you.

Mr. WHITAKER. You don't get the questions in advance.

[Laughter.]

Mr. FILLER. No, we don't.

First off is sustainment. We have to keep the system operating safely, which the center does very routinely.

Second is development of human capital. We have efforts underway to bring in co-op students and continue to develop our work-

force. We, like a lot of Government, have an aging workforce, and we are putting a lot of effort into making sure that we can sustain the quality of the work that we do here each and every day.

Third, obviously, is integration of UAS into the National Airspace System, understanding where this program is going, how we can contribute, and making sure that we have all the resources and the capability to go there.

The last area we are going to concentrate on this year is in the area of enterprise cybersecurity—making sure the whole enterprise is secure in an electronic sense.

Mr. LOBIONDO. Mr. Whitaker, is the FAA contemplating another strategic reorganization of the NextGen office? And if so, what role will the Technical Center have in the new structure?

Mr. WHITAKER. We don't anticipate any significant reorganizations at this time. The NextGen organization reports up to me, as does the PMO on the ATC side. So I have line of sight over that, all aspects of NextGen in that regard. The Technical Center will remain in its current status under Dennis, reporting up through General Bolton to me.

Mr. LOBIONDO. OK. And Dennis, as both head of R&D and for the FAA as director, what do you think the major challenges are that you see for the integration of unmanned aerial systems into the national airspace, and what do you think is going to be the most important to focus on first?

Mr. FILLER. The biggest challenge is going to be I think determining the proper starting point, an area of focus. The UAS problem is very broad, very complex. I believe that we have to start with a solvable management problem that has industry and Government backing behind it and focus on that and concentrate our resources on solving that problem, getting a good entryway of UAS into the national airspace.

The biggest barrier is going to be on, I think, the community coming together to say, yes, this is problem number one and this is where we should focus our resources. Everyone has different perspectives and different interests, but I believe that if we can find that first problem and we can all work together to solve that first problem rather than trying to solve UAS flying from low altitudes all the way through 60,000 feet and beyond, maybe concentrate in an agricultural area or some solvable, manageable problem, then we can focus our resources there, learn, and then we can expand and go into other domains.

Mr. LOBIONDO. Thanks.

Rick?

Mr. LARSEN. Thanks.

First for Mr. Whitaker. On the tour today we heard about the progress in ADS–B installations, and you mentioned it today, saying 95 percent of ground stations for ADS–B are installed, and this month at some point it will be 100 percent, and that would set a baseline. I think you used the term it would be the baseline for ADS–B. Can you explain what you mean by that, as opposed to when does the switch turn on?

Mr. WHITAKER. Once the installations are in, then the ADS–B system needs to be integrated with the new automation systems that are going to be running in the centers, particularly the ERAM

high-altitude centers. So as ERAM finishes up in the spring of next year, the ADS–B has to be integrated into that system.

This morning the term "system of systems" was used on a couple of occasions. These are two systems that have to be integrated together as part of the process going forward.

Mr. LARSEN. And you mentioned I think in your testimony 18 of 20 of the centers have ERAM running?

Mr. WHITAKER. About half of them run it full time with no backup in use. The others are in extended runs. So they may do a 72-hour run to look for bugs, go back to the old system, off and on. So 18 of them are in some form of running it. Over half of them are running it 24/7, and the others are still in this on and off phase. Within the next year we will have all 20 of them running it full time.

Mr. LARSEN. So a couple of weeks ago we had a roundtable and the chairman had asked you to outline a set of milestones by May 21st in regards to implementing the Tier 1A recommendations from the NAC—NextGen Advisory Committee. Can you sketch out what your thinking has been in the last couple of weeks to get us to that May 21st date?

Mr. WHITAKER. As we have looked at this, there were two groupings of Tier 1 capabilities. The first grouping deals with PBN, multiple runway operations and surface data. That grouping—and I believe there are six of them—were identified as being very important and on the verge of being completed and should get high priority. We think those are the right ones for our immediate attention. We have had some conversations with the NAC subcommittee about that, and we believe that they agree with that.

With respect to the date, we have a full NAC meeting in June. I am not sure of the date. I think it is early June. I think we have some concern that we ought to be validating the complete work with the NAC before it goes public. So we will talk with your offices about the timing of whether that would be an appropriate date or mid-May. But we believe we can be on track certainly with the work, and we will continue to talk with your folks about when to make that public.

Mr. LARSEN. Great.

For Dr.—are you a doctor? Merely a mister like me?

[Laughter.]

Mr. LARSEN. All right. Well, you ought to be a doctor.

Mr. FILLER. Thank you, sir.

Mr. LOBIONDO. So ordered.

[Laughter.]

Mr. LARSEN. Can you talk about what R&D activities this budget of $158.8 million does fund here at the Technical Center, and do any of those dollars specifically focus on UAS?

Mr. FILLER. So to answer the second part, the answer is yes. About half of the dollars that are in the UAS, in the ballpark of around $3.7 million, are supporting activities that are ongoing here at the center. Of the R&D budget of $158 million, $62 million or $63 million is work that is done specifically here at the center. A lot of the areas you saw this morning out at Research Row as I call it, those activities out there are supported by the R&D dollars.

Mr. LARSEN. How much flexibility do you have here at the center or as director of research to be flexible with those dollars, to move them from one bucket to the next bucket if you need to do that?

Mr. FILLER. We have very little authority to do that, sir. Basically, I have about a 2-percent reserve that I maintain to be able to help programs of that window. But again, those are budget line items, and we execute them as so programmed.

Mr. LARSEN. Right. In other words, Congress says that you have to spend X amount of dollars on this budget line item in research, and Y amount of dollars on that line item.

Mr. FILLER. That is what we do, sir.

Mr. LARSEN. And we would expect nothing less and nothing more.

[Laughter.]

Mr. LARSEN. Obviously. But if someone were to ask you directly if you needed even a little bit more flexibility, how would you respond to that?

Mr. FILLER. So, 10 to 15 percent flexibility to be able to handle more tactical R&D needs. The planning for the R&D budget is a 3-year window to the future. By the time we get to execute, again, we are working on a 3-year-old plan. So the ability to adapt, just like technology today is very quickly changing, to meet those pop-up needs and the changes in our environment I think would be greatly appreciated.

Mr. LARSEN. Today on the tour we saw an example of an unmanned aerial system that technically qualified as a small system, but because of how far it flies, it flies like a large system. So how are you going to approach that as we are looking at the test sites? How do you answer this question about small UAS and their application when it might look small but it acts big?

Mr. FILLER. I don't know how to answer the question, sir. Forgive me, but that is more of a policy kind of topic.

Mr. WHITAKER. I think with UAS we have a segmented approach. We would like to, if you will, release as much as we can as quickly as we can. So the focus of the small UAS rule is to move more quickly on a category of UAS that we think poses the least amount of safety risk, which is likely to include line of sight as one of the characteristics. So a model such as we viewed this morning would not be characterized as small to the extent it was operated beyond the line of sight.

Mr. LARSEN. Thank you. I yield back.

Mr. LOBIONDO. For Mr. Whitaker, I understand the FAA intends to appeal the administrative law judge's decision on small UAS oversight authority issued last Friday. Can you tell us, is the FAA also planning to conduct an expedited emergency rulemaking for small UAS?

Mr. WHITAKER. We are appealing that ruling, and because it is an active matter, I can't really comment on the substance of that. But I will say that we do view this as a serious safety issue and we are looking at our options to make sure that we keep the NAS safe during the appeal. The appeal will stay the ruling, so in that sense it won't take effect. But an emergency rulemaking is one of the options that we are looking at.

Mr. LOBIONDO. Mr. Filler, we talked about this a little bit, of the work that is being done here. What sort of research and development, if you can expand a little bit more than what you already said, is the Technical Center doing with common airborne sense and avoidance technologies? And are you working with the DOD on any of this research?

Mr. FILLER. We do work jointly with the Department of Defense and NASA, as well as industry. I can't at this moment recall the specific tests that are ongoing, but as you can see, we do a lot of testing that is going on here. But I do know that we do have routine flights of our test fleet to ensure that new systems are being safely integrated. This last summer, we did fly the ACAS–X system, which is again a collision avoidance system, to test out new logic. This coming summer we will, in fact, be flying variants of it that will be dedicated in using logic that we expect the small UAS to conform to.

Mr. LOBIONDO. Thanks, Dennis.

Rick, do you have anything else?

Mr. LARSEN. Yes. Back to sense and avoidance, I am just curious because last year, a year and a half ago, I went up with one of the contractors who developed sense and avoid, and we actually flew ourselves towards Mount Constitution on Orcas Island. I got close enough that it set off the alarm system. I don't advise that for anybody.

[Laughter.]

Mr. LARSEN. But they wanted to show how it works, and that was obviously a pilot in the flight deck. So I am curious about what the difference between a sense and avoidance system is on a manned system would be compared to an unmanned system, if it is something that operates automatically given an obstruction in the air inside a certain envelope.

Mr. FILLER. So, the term we use here is the "mark one eyeball." Obviously, the pilot has the responsibility to see and avoid. So, barring the absence of all electronic systems, we still rely on the eyeball and the visual cues. They are very, very hard to, in fact, emulate in the electronic systems. So, again, you don't have the pilot and his ability to discern to know that is not a real target, that is not something I am worried about. As we go into UAV operations, or even commercial GA, being a pilot at the moment, it is very difficult to see those aircraft out there. So not all the objects out there have active transmitters necessarily on board them yet so that we can actually see them. It is not a very trivial problem to solve. It still requires a lot of research.

Now, as ADS–B is implemented on almost everything that is on an airport or that flies, then we will have active beacons that are telling us where all these objects are in time and space, and we will have better situational awareness. But until the ADS–B is implemented throughout the national airspace, we still have to deal with the limitations of human vision.

Mr. LARSEN. Thanks. Thank you.

Mr. LOBIONDO. Well, Mr. Whitaker and Mr. Filler, thank you very much.

We will now adjourn from the first panel and ask the second panel to come up, take just a little recess, as long as it takes to get set up for the second panel.

[Recess.]

Mr. LOBIONDO. We are ready to get started with the second panel.

I would first like to welcome Mr. Pete Dumont, president and CEO of the Air Traffic Control Association.

Pete, thank you for being here.

TESTIMONY OF PETER F. DUMONT, PRESIDENT AND CEO, AIR TRAFFIC CONTROL ASSOCIATION; CYNTHIA CASTILLO, PRESIDENT AND CEO, CSSI, INC.; MELVIN DAVIS, NATIONAL REPRESENTATIVE FOR NEXTGEN, NATIONAL AIR TRAFFIC CONTROLLERS ASSOCIATION; BEN GIELOW, GENERAL COUNSEL AND SENIOR GOVERNMENT RELATIONS MANAGER, ASSOCIATION FOR UNMANNED VEHICLE SYSTEMS INTERNATIONAL

Mr. DUMONT. Thank you. Chairman LoBiondo, Ranking Member Larsen, members of the committee, thank you for the opportunity to speak to you today.

I am speaking on behalf of the Air Traffic Control Association. ATCA was formed almost 60 years ago. We currently have more than 3,000 members from all sectors of aviation. ATCA has partnered in one way or another with the Technical Center for the last 50 years. ATCA's primary mission is to promote the science of air traffic control.

As you know, NextGen is a complex, all-encompassing transformation of our current NAS. It requires a technology refresh, as well as procedural and policy changes. To accomplish such a large, complex project, the right management structure with the right capabilities must be in place. In recent months, the administration has appointed a new Deputy Administrator, who you just heard from, and the FAA selected an Associate Administrator for NextGen, Mr. Ed Bolton. This is certainly a step in the right direction. With this new management structure an evaluation of current assets and alignments must certainly occur.

Any strategic realignment or reorganization of the NextGen organization must surely include the Technical Center. We are encouraged that Mr. Bolton, in his short time at the FAA, has already visited the Technical Center on five separate occasions. The last time he was here, he used a simulator to gain some intel prior to taking a familiarization flight on an Airbus in preparation for a NAC meeting. Mr. Bolton seems to understand the value of the center and the critical role that it must play in the implementation of NextGen.

The Technical Center has many capabilities to move NextGen forward, as I am sure you saw on your tour of the facility today. I have outlined a number of those capabilities in my written testimony and would be glad to answer any questions regarding that testimony.

The Technical Center is currently performing NextGen work on datacom with Harris Corporation and with Exelis on ADS–B. These are but two models in which the Technical Center is partnering

with industry to move NextGen forward. The models are very different—one incorporates the use of industry personnel on-site at the Technical Center to work directly with the labs. The other collects data in the field for verification and validation by and at the Technical Center. I use these two examples to show the different models available. There are many industry partners and ATCA members performing indispensable work on NextGen for the FAA.

We believe one role for the Technical Center would be as the collection facility for all of the UAS test data from the six recently identified test sites throughout the U.S. The Technical Center could analyze and report out on the work being done at these facilities. Verification and validation both against specification and requirements cannot occur independently at six different sites. The lack of one central location will lead to duplication of efforts, siloed results, increased costs, and a multitude of other inefficiencies. This is only one of the ways the Technical Center can help move NextGen forward. I was pleased to hear that the FAA supports this approach.

The Technical Center requires both external and internal collaboration to be successful. For all of the state-of-the-art technology, people and processes in place, they are resource constrained and cannot do it alone. They must collaborate and partner to accomplish the goal of NextGen implementation.

This collaboration must occur both internally with different departments within the FAA, and externally with industry, academia, users, associations, and other Government agencies.

Internally, the Government must partner with program managers of individual pieces of the NextGen solution, as well as operators, through the union and facility management. These are the experts on requirements.

Externally, the FAA must continue to collaborate with industry to not only integrate new equipment and technologies but new regulations and procedures. Industry has the expertise to augment the skills and talents within the FAA at the Technical Center and to fill in the holes where the expertise is lacking. Industry already brings lessons learned to the table from large-scale integration and transformation programs in other industries, as well as within the FAA.

The Technical Center must also continue to partner with academia, as they have with the 14 universities taking part in a new 10-year research effort into alternative aviation fields, another area of NextGen.

And the Technical Center must continue to partner with associations, like ATCA, to ensure an open and frank discussion of solutions, planned and in progress, with the entire aviation community. This will enable the industry experts, users, and other association groups to understand exactly what the FAA needs in terms of resources, research, expertise and funding. Every significant air traffic control challenge the aviation industry has faced in the last 58 years has been discussed and debated at ATCA symposiums.

The Technical Center must itself be a NextGen facility, fully scalable both up and down. As the demands for support increase, the center must be able to expand to handle the workload, and as the workload decreases, the opposite must occur. This will require

additional support from contractors for personnel, as well as FAA employees. NextGen must move forward, and the Technical Center plays a vital role in its development and implementation.

I will be glad to answer any questions you may have regarding this opening statement or my testimony. Thank you very much.

Mr. LOBIONDO. Thank you, Pete.

Now we will turn to our next witness, Ms. Cynthia Castillo, president and CEO of CSSI, Inc.

You are recognized.

Ms. CASTILLO. Thank you and good afternoon. First I wanted to thank Congressman LoBiondo and members of the subcommittee for the opportunity to speak here today. I am specifically very proud to represent industry.

CSSI works with Government and commercial clients to ensure transportation systems are designed and equipped to safely and efficiently move people and materials. We leverage our deep roots in aviation to pioneer innovative analytics and best practices that maximize system capacity, decrease costs, and improve safety.

CSSI has participated firsthand in the evolution of the aviation industry over the last two decades. We have driven over 140 operational improvements as direct results of corrective actions taken based on our voluntary safety reporting programs. We have maximized the prospects of safety aviation travel with newer, stronger safety standards. We have helped thousands of aircraft meet RVSM certification requirements, therefore maximizing airspace capacity, reducing fuel burn, and saving millions of dollars in fuel costs.

In addition, we drive research, test and evaluation efforts to identify how unmanned aircraft systems can safely be integrated into the NAS, and we have supported NextGen initiatives that cut flight miles and increase fuel savings.

The Technical Center is one of our key partners. Most of the work we do at the Technical Center directly contributes to the aviation modernization efforts and drives results in three key areas: improving aviation safety; the safe integration of the UAS into the NAS; and NextGen.

Safety, as you know, Mr. Chairman, is the aviation industry's top priority, and improvement initiatives are prevalent throughout all aviation modernization efforts.

CSSI has fostered the development of safety management systems that enforce newer and stronger standards for managing safety risk and accountability, and minimizing the risk of safety incidents occurring. We also drive the development of nonpunitive safety reporting programs and industrywide information sharing programs.

A cornerstone of our aviation safety work at the Technical Center is the development and implementation of global and regional separation and performance-based standards. As part of our role, we work with the international regulators and participate in every step of the international standardization process.

Our work in separation standards includes the successful implementation of reduced separation standards for specific types of aircraft in the New York Oceanic Flight Information Region. In addition, as part of the North Atlantic Datalink Mandate, we have increased the percentage of flights that use future air navigation sys-

tems and text-message-like communications between pilots and controllers, resulting in enhanced operational safety in the North Atlantic.

Introducing UAS into the Nation's airspace is challenging for both the FAA and the aviation community. CSSI works with the Technical Center to bring a real-world perspective to modeling and simulation scenarios that emulate this complex air traffic control environment. The lessons learned can be relied upon to accurately characterize the workloads expected in a NextGen environment.

Maximizing the safe and efficient use of airspace in airports is critical to accommodate future aviation demand. The aviation industry is working hard to meet the challenge of FAA forecasts that predict 1 billion passengers by 2015. To meet this challenge, CSSI works closely with the Technical Center in support of NextGen concepts such as testing and implementing pilot projects under the Runway Incursion Reduction Program and optimizing airspace and procedures in the metroplex in 8 of the 21 regions, with 10 more planned.

The FAA is working tirelessly to modernize what is already the safest and most progressive aviation system in the world. At CSSI, we are proud of how we have partnered with the Technical Center to integrate new technologies into the NAS, all of which will enhance safety, save fuel, reduce delays, and increase capacity.

Government and industry must continue to collaborate closely to achieve NextGen milestones in the face of tight deadlines and budget challenges. It is imperative for the future of air transportation and for our Nation's economy.

Mr. Chairman, this is why it is so important for the FAA and the Technical Center to receive the support they need to stay at the leading edge of aviation technology and to contribute to set the gold standard for the rest of the world. The traveling public deserves nothing less.

This concludes my testimony.

Mr. LOBIONDO. Thank you, Cynthia.

Our next witness is Mr. Melvin Davis, National Representative for the NextGen National Air Traffic Controllers Association.

Thank you for being here.

Mr. MELVIN DAVIS. Mr. Chairman, Chairman LoBiondo and Ranking Member Larsen, thank you very much for the opportunity to be here. NATCA is honored to have this opportunity to address the committee on this fine afternoon in New Jersey.

NATCA takes seriously its responsibility to represent the 20,000 bargaining unit members around the country, some of who are stationed here at the William J. Hughes Technical Center. We embrace the Technical Center's role in the research, development, testing, integration, sustainment, and modernization of the components of the National Airspace System.

The aviation industry has collectively recognized that the transition to a next-generation air transportation system will not happen all at once. Progress will be methodical, and it will be iterative. It will require new systems and capabilities to be deployed alongside legacy systems.

The Technical Center is essentially a miniaturized version of a complete legacy National Airspace System in one location. With

ATOP, micro-EARTS, TAMR, ERAM, TFMS, TBFM, SWIM, and the voice switches all located in one place and maintained at the same readiness level as those systems deployed across the Nation, the Technical Center truly represents a one-stop shopping opportunity to test and initially deploy the next-generation systems in conjunction with our now-gen systems. This physical capability, combined with the technical experts from many of the different aviation domains working here, enabled by relevant Federal acquisition and operational policies, represent a truly unique national asset.

The Technical Center is the location where many of our current air-traffic controllers come to interact with both the FAA technical staff and the civilian team members from the various vendors, contracted by the Government, to produce the systems currently deployed across the NAS. These interactions within the FAA firewall with equivalent systems to those which they operate daily back home are invaluable to the current sustainment and future progress of the NAS. This value is directly measurable in three ways.

First, by increased efficiency from current systems. An example of this is the second-level support that extends the lifespan and expands on latent capabilities of current systems. So, as we deploy NextGen systems alongside the legacy equipment, the second-level maintainers here in New Jersey assist with resolving the inevitable interactivity issues that crop up.

Second, by reducing problem reports with systems during the deployment phase. For example, operational test and evaluation combined with verification and validation expedite resolution of problem reports. The problem reports are a tracking mechanism used by controllers and maintainers to resolve issues associated with the deployment of new systems such as ADS–B or time-based flow management.

The third way we can measure these enhancements is by reducing the risk of fielding new systems. An example of this is the human factors community, work done by the human factors researchers to detect and resolve conflicts between humans and machines, referred to as human-machine interface or computer-human interface. This work is essential to ensuring that the capabilities like data communications will function as intended once deployed.

Another significant capability resident here at the William J. Hughes Technical Center is the scientific community that supports the wake turbulence programs. The scientific evaluation of wake turbulence, which is very in-depth and very specific, has produced relatively simple solutions derived from that body of work which was conducted mainly here at the Technical Center and has recently been deployed within the NAS. The result of these deployments have had dramatic effects, creating significant capacity enhancements both safely and efficiently.

I would like to close my verbal testimony by stating that all of these things that I have described are the result of a harmonious relationship between Government, labor, scientists, technicians, and private vendors, made possible by the common understanding that the whole is greater than the sum of its parts.

On behalf of NATCA, I would like to thank you again for the opportunity, and I look forward to your questions.

Mr. LOBIONDO. Thank you, Melvin.

Our next and final witness is Mr. Ben Gielow, the general counsel and senior government relations manager for the Association of Unmanned Vehicles.

Ben, thank you for being here.

Mr. GIELOW. Chairman LoBiondo, Ranking Member Larsen, thank you for this opportunity to speak to you today. It really is a true honor for me as a few years ago I was staffing then-Congressman Vern Ehlers on this committee, which happened to be his favorite committee. So it is a real pleasure to be here.

Today I am speaking on behalf of the Association for Unmanned Vehicle Systems International, AUVSI. We are the world's largest nonprofit organization devoted to the advancement of unmanned systems.

As you know, unmanned aircraft systems, or UAS, increase human potential, allowing us to execute dangerous or difficult tasks safely and efficiently. This technology also has the potential to create tens of thousands of jobs and tens of billions of dollars in economic impact.

Because of costs and rapidly advancing capabilities of small UAS, such as this 2-pound quad copter that I brought for show and tell, it will comprise a majority of the developing commercial market. Most of these operations will be conducted below 500 feet, with limited need to fly above 1,500 feet.

However, the current pace of UAS integration specifically for small UAS is simply unacceptable. The FAA has been working on a rule for small UAS since 2009, which should have been finalized in 2011. Unfortunately, the FAA does not plan on releasing this rule now until the fall, which means it likely won't be finalized until sometime in at least 2015. The longer the FAA takes to write these regulations, the greater the risk to aviation safety because people are already flying these systems, as a simple YouTube or Google search will be evidence of that.

The need for this rule became even more evident last Thursday when a judge with the NTSB ruled that the FAA has no authority to regulate model aircraft or unmanned aircraft systems because they have not gone through formal rulemaking. As was stated earlier, the FAA has already appealed this decision and it may, in fact, issue an emergency rule. That is all yet to be determined. We hope that if an emergency rule is issued, that it will not be overly restrictive on small UAS.

Regarding work at the Technical Center, the FAA has long complained that it needs data to safely integrate unmanned aircraft systems, and the Technical Center is the logical place to do that data work. However, the UAS research department at the Technical Center is understaffed, it is under-resourced, and its current research is not based on a strategic plan to integrate unmanned aircraft systems into the NAS.

Although the FAA's UAS research budget has grown in recent years from approximately $4 million in 2013 to $8 million in 2014, and possibly $9 million in 2015, there is currently less than five full-time UAS researchers here at the Technical Center. The rest

of the researchers are either contractors or on loan from other departments. We would like to see this core team expanded.

Currently, all UAS research at the Technical Center is funded through the FAA's research and engineering and development budget, which provides very little flexibility on how funds can be used. I think that was addressed a little bit earlier. In this research budget, all FAA research programs have to compete against one another, and it is the FAA's technical community representative groups that makes the final decisions on what projects do, in fact, get funded.

In 2014, six UAS projects were approved by the TCRG, with a total budget of approximately $8 million. Interestingly, none of them were for UAS test site data management. However, now that the sites have been selected, the FAA is in need of a location to store and analyze the data, as well as resources to do that data analysis. Because no new money is available in the research budget because of inflexibility, the FAA was forced to cancel one of its existing projects and use about half of that amount, roughly $500,000, to initiate the test site data work.

In our opinion, if the FAA is committed to using the test sites to collect and analyze data, $500,000 is going to be inadequate. Furthermore, according to the FAA, because they were not given money to start up or manage the test sites, the FAA is unable to direct any research work at these test sites. So this begs the question, what type of data will the test sites collect? Will everyone be speaking the same data language? Where will the data go? We assume here at the Technical Center. How will proprietary information be protected? How will the data be used? How will duplicative work be avoided?

The FAA hopes to iron out these details when it brings the six sites together here at the Technical Center later this month.

Lastly, we would like to request that the committee closely monitor the FAA's compliance with a provision in the 2014 defense bill that requires a report to Congress this summer on the resource requirements needed to implement the UAS roadmap. Understanding how much it will cost to integrate unmanned aircraft into the national airspace will help us to understand the size and the scope of this problem. If, for whatever reason, the FAA can't meet that deadline, then we suggest the GAO possibly be tasked with it.

UAS offers great promise, but before this industry can take off, we need the safety rules, and it is in all of our best interests to help the FAA get the data it needs to write the safety regulations. The Technical Center, along with industry, Government, and others, are willing to do that work.

So again, thank you for this opportunity. I am happy to answer any questions.

Mr. LOBIONDO. Thank you.

Just for clarification, what you have in front of you is not a model? It is actually a working size?

Mr. GIELOW. So the only thing that differentiates a model aircraft with an unmanned aircraft is the intent of flight. So you could buy this system yourself, Mr. Chairman, and fly it, and as long as you are doing it for recreation or for fun, if you have a smile on

your face, you would be considered a modeler. You would not have to comply with FAA regulations.

Mr. LOBIONDO. What you have in front of you actually can fly?

Mr. GIELOW. Yes, yes. This is an actual system. They did not give me the ground control station, so I can't fly it, but it does have a system underneath here. If you were to use those pictures and sell those pictures, the FAA would deem that a commercial activity and that would be prohibited.

Mr. LOBIONDO. Prohibited. OK. Thank you.

The first question is sort of a multipart question for anyone on the panel who would like to take a shot at it. What do you see are the major challenges to integration of UAS into the national airspace? What area do you think is going to be the most important to focus on first? And based on your knowledge of the Technical Center, how can the resources and expertise of the Technical Center be leveraged to help meet the challenge?

Who wants to take the first shot at that?

Mr. GIELOW. I will go ahead and jump in and take this first. So the challenges for integration, there are a lot of them. I mean, this is a huge challenge, and as was talked about in the first panel, you know, systems like this that weigh 2 pounds, all the way up to the systems that weigh 30,000 pounds, this should not be a one-size-fits-all kind of solution that is needed.

I think, to emphasize what Director Filler said, if we focus on things that we could do now—for instance, small UAS operations over farms or some kind of activity where there is a minimal safety risk—to get some sort of commercial activities now will alleviate a lot of the built-up pressure faced by the industry today, which is currently prohibited from flying at all. So I think if we bite off a little bit, that would help.

As far as the work that the Technical Center can do, they are doing good work. They are doing a lot of sense and avoid work, some command and control stuff. But the Technical Center has never done research work in small, unmanned aircraft. All of their work has been focused on the big stuff, flying in Class A airspace. The reality is the commercial market is in small UAS.

Mr. MELVIN DAVIS. Mr. Chairman, as an air traffic controller, obviously it goes without saying clearly where our hearts are in the matter. There are some inferences automatically when you start talking about unmanned systems or autonomous systems, that there is an inherent lack of viability to control what it does, being no actual pilot. So there are clear concerns there, but those again are just kind of built in. We will need to work through those. We will need to work with the UAS committee on those.

But what I would say as far as major challenges in general as far as integrating UAS into NAS is kind of back to that air traffic control aspect. Is there going to be a pilot that is operating it, or is it just an operator?

So one of the things that happens in the system, in this system today, is there are humans that have procedures and training, and generally when things go well, we are following the procedures and training to the tee, and when things go bad, there are fallback procedures and there is fallback training. So I think when you start to get down a little bit lower into the operator category, if we are

not ensuring that those procedures and training are there or built in or regulated, we could see some challenges there.

So that goes back to the first part of your question, what is a major challenge.

Another one is what the role of the Technical Center will be and what role it could play. I think that the Technical Center is uniquely situated to greatly assist the effort to integrate UAS in the NAS for two reasons. One is because of all of the resident systems that are already here that represent what is operating already in the NAS. In addition to that, there has been some wisdom applied to it to bring in UAS capabilities into the NIEC lab. That was an investment by the Federal Government to deploy a lab here that had NextGen systems in it and that also put UAS systems into it.

So I think we have a neat opportunity there on the NIEC lab. The second piece of that, though, as Mr. Gielow mentioned, the proprietary data, the ability of the Federal Government to bring in multiple vendors to share information and have a firewall to protect it, and then we could evaluate that information and make decisions without a vendor necessarily losing a competitive advantage.

Mr. LOBIONDO. Anybody else?

Mr. DUMONT. Yes, Mr. Chairman. Integrating UAS into the National Airspace System is probably the most difficult task we have ever attempted since the beginning of flight. Normally it has been faster and larger aircraft which have their own issues integrating into the NAS. The problem with UAS integration is there are so many different kinds with so many capabilities and so many different missions.

You spoke of sense and avoid and how you will have piloted aircraft. Well, piloted aircraft, a Global Hawk, which is an unpiloted aircraft, have a large payload capability, and they can have the equipment on board for sense and avoid. To have sense and avoid on this particular UAS right here, that would be much more difficult.

How the Technical Center can help us with those types of issues is to partner with industry, bring industry in to find out what their needs are, what their capabilities are, what type of vehicles actually want to fly in the airspace, and develop a concept of operations which many industry partners have done on many different types of projects. So they could be very helpful in that. And then use the NIEC, like Mel was referring to, to model, simulate the flying of these different types of UAS in different types of airspace to see what the results would be so that we can integrate them successfully into the airspace.

Ms. CASTILLO. I would like to just expand on some of the challenges that were already addressed, specifically with the standards and procedures of operating in the NAS. In integrating UAS, I believe some of the work that the Technical Center does today specifically with modeling and simulation, realistic scenarios of how UAS integrated into the NAS operate within the NAS, continuation with the work that they do provide here, a lot of the modeling and simulation, CSSI has been very intimate with that.

Mr. LOBIONDO. Rick?

Mr. LARSEN. Mr. Davis, has the FAA or has NATCA contemplated new training or procedures for air traffic controllers as UAS is integrated into the national airspace?

Mr. MELVIN DAVIS. Yes, Ranking Member Larsen. The good news is—and I should have stated it foremost in my initial response to Chairman LoBiondo's question—the good news is that there is an incredible amount of UAS operations occurring daily in the NAS with multiple partners and with tons of actual piloted aircraft interactions and controllers involved. Somehow or another, in spite of all the delay and bureaucracy that goes on, there is a lot of learning that is going along with that.

So I can say that if we look back in 2, 3, 5 years or so, are we smarter now than we were then? Yes. Are we capturing those lessons and applying them and starting to lay down some of the basics? The answer is yes.

Could we be doing it better and more methodically in addition to all the other work that is going on? Absolutely. Could there be progress? Could we be expanding and doing it better? We could.

But the good news is that, yes, through that concept of partnership, I will just take for just a moment and expand on the scenario that has been deployed across the NAS for the last couple of years. It is called a trust culture, and it was an effort by the Federal Government to actually trust the employees, both on the airline side and the controller side, to say tell us what is going on so that we don't have to look back at an accident, which is a risk-based view. We can look forward at problems via a predictive mode.

So we have employees that fill out extensive reports about something that didn't result in an accident, but it was an incident, and it would not have borne the full investigative arm but it encourages people to tell the truth and to tell deeply and specifically what happened so that we can put it into a database and then later mine that database to find hot spots where things might occur.

That is a classic example of, again, wisdom and forward-thinking and trust, and we are able to mine those databases for both training and for predictive safety measures and those types of things. So that will bear immense fruit as we move forward, and that program is called Aviation Safety, et cetera—ASIAS.

[Laughter.]

Mr. MELVIN DAVIS. It is awesome.

Mr. LARSEN. Frank and I both know this, and some folks. This may be your first hearing you ever participated in ever, even watching. There is just a lot of abbreviations and acronyms, and we get a little too used to it, and we apologize.

Mr. MELVIN DAVIS. You are very gracious. Thank you.

Mr. LARSEN. Mr. Dumont, with regard to the symposia that ATCA has, have you developed a consensus on UAS? And second, have you developed a consensus on what the next big question is for ATCA to address? What is the next one?

Mr. DUMONT. Have we developed a consensus on——

Mr. LARSEN. A solution on how to approach things. I mean, you have symposia. I know they are in Atlantic City, and I know it is not just for fun. You say you struggle with the questions. You have the input. Do you come up with consensus recommendations as an

industry through symposia on what to do about any of the big questions that we are facing?

Mr. DUMONT. Oh, we do, yes. I thought you were talking about just UAS. And, no, it is not just for fun. We do a lot of work in ATCA. As a matter of fact, one of the comments I get at our 3-day symposium here in Atlantic City with the Technical Center is that we get 6 months of business done in 3 days.

We have come to consensus on a lot of different issues. What we normally do when we come here to the Technical Center, it is a technical exchange of information. My members, a majority of them, want to know what is going on here at the Technical Center, and as they get briefed on it and they understand all the programs that are in place here, they walk away with ways that they can help the Technical Center and then come back and work with the Technical Center to help them advance their mission.

Mr. LARSEN. What is the next big question for us, then? Dealing with UAS? Working through NextGen? UAS is a big question. Do you know what the next big one is?

Mr. DUMONT. I don't know what the next big one is. I mean, as far as UAS is concerned, concept of operations. That is a very important thing, and we need to get that straight.

Mr. LARSEN. On data sharing, have you all as an association group come to conclusions on data sharing? One question we hear in the discussion about UAS and getting the data from test sites is the proprietary nature of some of the data.

Mr. DUMONT. Right.

Mr. LARSEN. Have you all as an association group come to some conclusion about how the Technical Center or FAA should address that proprietary data?

Mr. DUMONT. Well, no, because there really is no solution yet. We haven't been told how the data collection is going to occur. Is it going to be at individual sites? Is it going to be shared and collected here at the Technical Center? Which we think is the right model.

I think, Ben, you have some information about data sharing?

Mr. LARSEN. Go ahead, Ben.

Mr. GIELOW. If I may, right now I don't think there is a data plan for the U.S. test sites. I mean, when they bring all six together here at the Technical Center, I think they are going to hash it out. But again, because the FAA doesn't have any funding for this, the FAA can't really tell the sites what testing to do. So hopefully everyone will come to an agreement on the bits that they need to collect and they can all speak that same data language, which I am terrible at. I hope I don't have to get too much deeper.

Mr. MELVIN DAVIS. I have one point that I believe is relevant to the data sharing question and something that I have just experienced within the last 4 or 5 months in the NextGen, the broader NextGen effort, and it kind of goes back to a statement that I made earlier about trust and about the ASIAS program is a trust-based program and it is a partnership between the Federal Government and the operators within the NAS.

At the NextGen Advisory Committee level, there has been a renaissance, if you will, on the thought of data sharing on behalf of the airlines. There is fuel data sharing and operational data shar-

ing to go back and prove the benefits of NextGen, and I firmly believe that it is because of the trust that has been built that the NextGen Advisory Committee, those relationships between Government and vendors that sit in a room together once every 3 months and work out the details and say, you know what, as an aviation community, we have to work together to improve the community; whereas I think before, prior to that trust being built, there was a standoffish attitude that said I am going to protect my data, even if it is to my detriment.

So I see that renaissance there, and I think there is an opportunity to potentially establish relationships with the UAS operators and leverage that trust.

Mr. LARSEN. And finally, Ms. Castillo, could you pick one of the projects that your company has worked on and be more specific about the role that you all played in supporting the Technical Center?

Ms. CASTILLO. Sure. I was thinking of that question. I will stick with separation standards. I know a lot of the conversation today has centered around the UAS, and in my belief the same separation standards will always be a priority of the FAA.

We have worked closely with our Technical Center partners, and specifically with global and regional separation standards components, and through our work we have helped thousands of aircraft achieve RBS–M requirements. So we have helped through really all aspects of reduced vertical separations minima RBS–M requirements, from development and implementation to the assisting with approval of flying in that airspace, and I am really proud of the work that we have done with our partners here in separation.

Mr. LARSEN. So what does that work entail?

Ms. CASTILLO. So, a lot of the work of the safe separation of aircraft which, when you are introducing other obstacles or other demand for users in aviation, we have to always look at how those things are safely integrated in addition to how aircraft and things integrated in the NAS are safely separated. So to me, it is all about increasing, maximizing the capacity of airspace. So we look at models and concepts of airspace redesign, and it specifically touches a lot of the performance-based navigation.

So to me, it is about maximizing capacity of airspace, thereby reducing fuel costs and fuel burn and emissions, if you will, and saving a lot of dollars for the flying public.

Mr. LARSEN. I yield back.

Mr. LOBIONDO. This is also a question for any one of the panel. What role will partnerships between FAA, industry, labor, and academia play in the future of NextGen, and what role do you see the Technical Center playing in developing and utilizing these partnerships?

Ms. CASTILLO. I will start. I appreciated the first panel talking about the partnerships because collaboration is going to be key to our continued understanding of how certain impacts to the NAS will occur.

CSSI, my company, has been partnered with the FAA for over 23 years, but specifically with the FAA Technical Center for about 20 years, and we feel that CSSI and companies like CSSI augment and complement a lot of the talent, the technical talent here at the

Technical Center in skill sets, as well as capabilities, to, if you will, show up in a broader, deeper way as a team, taking on the challenges or the initiatives that are at hand.

And I think recently in some of the challenging times of budget constraints, companies, contractors, industry can provide the skill sets, the specialized skill sets to perform duties, whether they are long- or short-term. So we have readily available resources to come in and work a task, whether it be 3 months or so.

So I think augmenting and complementing the skill sets here, the partnerships with universities certainly is an avenue for recruitment and the future operators in leadership, if you will, of what will be running and operating the FAA and all of the challenges that we are dealing with today.

Mr. DUMONT. There are multiple partnerships, internal and external partnerships that have to occur, internal partnerships with the users, the operators, the program managers, as I mentioned in my opening statement. That is to define the requirements and make sure we get them right. Then we need to partner with industry to bring some of those solutions to the table that we might not have thought of within the industry. They fill the holes that we don't have expertise-wise, and they bring experience to the table from multiple programs in different industries so that we can learn from that what we might not have thought of. That helps us to address the requirements and produce outcomes that are measureable so that we can measure our success.

Mr. MELVIN DAVIS. So, one of the things that I have been blessed with is the opportunity to work in the Federal Government in a time of no partnership, in a time of very strong and deep partnership. I can tell you, based on the deep relationships that I had before we went into those times and those relationships I was able to maintain and then enhance afterwards, it is a very passionate point of mine that I would like to make that the value of partnering with the human capital, ensuring that there is clear and open communication on the human side, especially as we move into these complex systems of systems, there are interactions that will occur that no one will be able to understand and you will not be able to map back and clearly explain exactly what went wrong.

But with the value of those strong partnerships, of being able to have honest and open dialogue, to be able to at least bracket certain corners of what happened and say, OK, we don't want to go there again because of those complexities, but to be able to understand as much as we can about them will prove invaluable as we continue to deploy systems that overlay each other and interact with each other.

Mr. GIELOW. I would just like to add that the test sites themselves would like to see the Technical Center more involved. Our members would like to see the Technical Center more involved. In fact, I think some of our members had actually either loaned unmanned aircraft to the Technical Center or simulators for the Technical Center to use in some of their UAS work because this was obviously very new to them. I think that our members are interested in continuing that relationship.

Mr. LOBIONDO. Mr. Dumont, this one is for you. We think one of the biggest challenges currently facing us in the short term for

NextGen implementation is rewriting the controller handbook to allow the use of NextGen procedures in a mixed-equipment environment. Do you think that the Technical Center can use tools like the NIEC to help facilitate that, or any other suggestions to help facilitate that?

Mr. DUMONT. OK. I think those are two separate questions, actually. So I think we absolutely need to use the NIEC. As we talked about briefly, the NIEC is very important in its role of being able to simulate the current environment, introduce new technologies, see how those new technologies work in different simulated scenarios, whether it be a busy timeframe or a not-busy timeframe. What works at JFK might not work in Seattle. So that is important.

But the role of the NIEC would be to develop a solution that can be implemented in the airspace. And then once that solution has been developed, you will need to rewrite the handbook so that the controllers are aware of what the procedures, rules and regulations are to be able to use that new technology and implementation.

Mr. MELVIN DAVIS. I think, Mr. Chairman, if you don't mind, actually on the specific controller handbook, 7110.65, my handbook——

Mr. LOBIONDO. What was that again?

[Laughter.]

Mr. MELVIN DAVIS. I would say that there was the previous chief operating officer at FAA, David Griswold, identified very accurately a lag in the deployment of technology and the waiver of the use of that technology, and then the institutionalization of that within the 7110.65. So there was a workgroup that started that was hyper-effective at lasering in and getting those changes into the 7110.65 and able to make up that lag in a very short period of time. It would be unfortunate to see that lag come back.

As far as the NIEC is concerned, specifically we could front load that process, right? And predict what we need to change in the .65, some of the use of the capabilities built into the NIEC. And I think it goes back to your original question, Ranking Member Larsen, to Mr. Filler, about having some flexibility within his budget to be able to say, listen, I know I am going to need to do something at that NIEC within the next 3 years; I am not sure what, so give me some room to maneuver in the meantime, and we can use that flexibility to make sure we are ready when the time comes.

Mr. LOBIONDO. Thank you.

Well, I want to thank our panelists, both panels very much. This is obviously a very important issue. I would like to thank our host, the FAA, and once again to most importantly thank the men and women of the Technical Center who, on a day-in and day-out basis, have a commitment to excellence and are producing such great work here.

So, with that, the committee stands adjourned.

[Whereupon, at 3:34 p.m., the subcommittee was adjourned.]

STATEMENT OF MICHAEL G. WHITAKER, DEPUTY ADMINISTRATOR, FEDERAL AVIATION ADMINISTRATION AND DENNIS FILLER, DIRECTOR, WILLIAM J. HUGHES TECHNICAL CENTER, BEFORE THE U.S. HOUSE OF REPRESENTATIVES COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, MARCH 11, 2014.

Chairman LoBiondo, Congressman Larsen, Members of the Subcommittee:

Thank you for the opportunity to testify today about the Next Generation Air Transportation System (NextGen), Unmanned Aircraft Systems (UAS), and the valuable assets of the Federal Aviation Administration (FAA) William J. Hughes Technical Center.

NextGen

NextGen is a significant undertaking for the United States. It is one of the largest aviation infrastructure projects in history and it is crucial to our nation's aviation system and success in the global economy. We have already made tremendous strides in delivering NextGen and we must continue to move forward with its deployment. We are nearing completion of NextGen's foundational programs that are necessary for us to implement NextGen capabilities.

Our initial focus has been on an advancement of the basic infrastructure that runs our airspace – moving us from a ground-based radar system to a satellite-based system. This has included an upgrade of the basic hardware and software systems that allow us to control the airspace. We are in the final stages of upgrading the 1980s-era computer system that has been running our nation's high altitude airspace system with much more sophisticated equipment. This program – En Route Automation Modernization, or ERAM – will provide benefits for users and the flying public by increasing capacity and efficiency, as well as allowing us to add new capabilities into

the airspace system. We have made significant progress on ERAM and continue to move ahead with upgrading our en-route centers.

We have also made progress upgrading the aging computer systems that run our nation's approach radar airspace. This program, Terminal Automation Modernization and Replacement, or TAMR, will increase efficiency by combining and upgrading several air traffic control technologies into a single system. This is a massive project that requires switching out the computer processors, screens and software, and re-training controllers in more than 150 TRACONS—all without disrupting service. The large TRACON segment, which is a substantial part of the TAMR program, will be largely complete in 2016.

We have already completed the upgrade of our oceanic centers in New York, California and Alaska – with the program known as Advanced Technologies and Oceanic Procedures, or ATOP. This technology allows us to benefit from the efficiency of NextGen in controlling air traffic in 24 million square miles of oceanic airspace.

And, finally, we have installed more than 90 percent of the ground transceivers needed across the country to enable Automatic Dependent Surveillance-Broadcast. ADS-B will transmit aircraft location to controllers and other ADS-B equipped aircraft with a dramatically faster update than radar – in essence, taking us from two-Dimensional to three-dimensional awareness of aircraft location. This added awareness enhances safety and saves operators and passengers time, fuel and money. Ground station installations will be completed later this year.

All of this software, hardware, and equipment form the foundation of NextGen. In addition to building this new foundational infrastructure, we are building new procedures that allow users to take advantage of new technologies. These procedures allow the FAA to guide and track aircraft more precisely on more direct routes, which cuts flight miles and reduces fuel burn, making air travel more convenient, predictable, and environmentally friendly, while providing additional capacity for air traffic.

Performance-Based Navigation (PBN) uses the precision of GPS to create more efficient approaches into and out of major airports. New descent procedures allow aircraft to reduce engine power and virtually glide down to the runway. This leads to reduced fuel burn, which reduces the carbon footprint of large air carriers, as well as reduced noise. New approaches at Phoenix Sky Harbor International Airport are saving more than $6.4 million per year. In Seattle, as part of the FAA's Greener Skies Initiative, airlines are using NextGen precision routing to shave four to six minutes off flight times, providing an annual projected savings of more than $13 million. In Atlanta, the precision of NextGen performance-based navigation means we can safely allow jets to take off on headings that are slightly closer together. This small but important change has resulted in a 10 percent increase in departures per hour from the world's busiest airport, saving valuable time and increasing system capacity. We expect these improvements to save more than $20 million annually in Atlanta alone. We intend to bring this efficiency to other major airports across the country as we continue to implement NextGen capabilities.

One of the most exciting new capabilities we have underway is Data Communications (Data Comm). Data Comm allows us to communicate through digital written instructions to pilots, which reduces the possibility of error with radio communications. More importantly, Data

Comm allows us to communicate highly complex clearances that are difficult to convey over the radio – instructions that can be automatically loaded into the aircraft's flight management system. This will ultimately save operators and passengers time and money, and will vastly improve the flexibility and efficiency of our operations.

While we are already seeing the benefits of NextGen capabilities, there is much more to come.

Unmanned Aircraft Systems (UAS)

The FAA has successfully brought new technology into the nation's aviation system for more than 50 years, while maintaining the safest aviation system in the world. Unmanned Aircraft Systems (UAS) are the latest aircraft technology to be developed and integrated into the National Airspace System (NAS). Our goal is to safely and efficiently incorporate UAS into the NAS. The announcements of the UAS Roadmap, the Comprehensive Plan, and UAS test site selections are all concrete steps in support of that goal.

For the last two decades, the FAA has authorized the limited use of unmanned aircraft for important missions in the public interest. These include firefighting, disaster relief, search and rescue, law enforcement, border security, military training, and testing and evaluation. About 36 law enforcement agencies now operate unmanned aircraft under certificates of authorization. Universities also use unmanned aircraft for research into weather, agriculture, and industrial uses. The FAA estimates that we can expect 7,500 small unmanned aircraft in the NAS over the next five years. That will include a large number of commercial UAS.

In December 2013, the FAA announced the selection of six UAS test site operators. The FAA made a concerted effort to pick sites that reflected both geographic and climatic diversity. We also took into consideration the location of ground infrastructure. We looked at the type of research that would be conducted at each site and the aviation experience of the applicants, as well as the type and volume of aircraft that fly near the sites. Our research goals are focused on (1) gathering system safety data, (2) aircraft certification, (3) command and control link issues, (4) control station layout and certification criteria, (5) ground and airborne detect and avoid capabilities, and (6) impacts on affected populations and the environment.[1]

The FAA's long term goal of UAS integration will utilize the test sites to help answer key questions and provide some solutions to the issues noted above, as well as how UAS will interface with the air traffic control system. This information will help the FAA to develop regulations and operational procedures for future civil commercial use of UAS in the NAS.

Data from the test sites in these areas will help identify elements of the certification and navigation requirements we will need to establish for unmanned aircraft. And a significant portion of analyzing this data will take place at the Technical Center in Atlantic City. To date, the Technical Center has been involved with the test sites and UAS integration efforts in a variety of ways, including:

- Providing program management and research evaluation personnel for the site selection process;
- Managing the agreements with each of the test site operators;

[1] The six UAS test sites selected are: the University of Alaska, the State of Nevada, New York's Griffiss International Airport, the North Dakota Department of Commerce, Texas A&M University – Corpus Christi, and Virginia Polytechnic Institute and State University (Virginia Tech).

- Administering the partnership the Agency has with New Mexico State University for a UAS Flight Test Center;
- And conducting various UAS Research & Development activities utilizing labs and personnel located at the Technical Center.

Once the test sites are operational, the Technical Center will continue to collaborate with the sites, and that collaboration will evolve based on the research activities being conducted.

NextGen is Key to the Safe and Efficient Integration of UAS into the NAS

The safe integration of UAS in the NAS will be facilitated by new technologies being deployed as part of NextGen. NAS Voice System (NVS), Data Communications (Data Comm) and System Wide Information Management (SWIM) will provide more information, flexibility, situational awareness and a greater ability to communicate. These features are necessary to enable safe and efficient integration of UAS into the NAS. Additionally, the FAA is aware of and is actively working on cybersecurity issues related to our NextGen programs.

NVS will allow ground-based UAS pilots to communicate directly with the air traffic controllers – a key requirement in integration – over the ground-to-ground communications network. Safe integration will lead us from today's need for accommodation of UAS through individual approvals to a time when unmanned aircraft can "file and fly" in the NextGen environment. It will improve the efficiency and reliability of exchanges between the UAS flight crew and air traffic control. NVS networking capabilities enable greater flexibility in developing and using airspace/traffic assignments in all airspace. Additionally, a "party line" requirement integral to

NVS adds to the overall situational awareness of UAS flight crews by allowing multiple participants to communicate.

Data Comm applications enable controllers to send digital instructions and clearances to pilots, and to exchange more complex four-dimensional (comprising latitude, longitude, altitude and time) trajectory data, including position, navigation and timing information. For UAS operators that elect to equip their aircraft, air traffic control messages and instructions will be exchanged via Data Comm to the pilot in control.

SWIM is the network structure that will carry NextGen digital information. SWIM will enable cost-effective, real-time data exchange and sharing among all airspace users, enabling increased common situational awareness and improved NAS agility. SWIM supports a loosely coupled service-oriented architecture that allows for easier addition of new systems and connections to include UAS users of the NAS.

Network-enabled access to more timely and improved information throughout the NAS serves as a major enabler for future operations, including UAS. All information about a given flight (e.g., capabilities, constraints, preferences) is contained within the flight object and made available to system stakeholders and air traffic management service providers based on information needs and security protocol.

Information on Special Activity Airspace and other airspace status is contained in ground automation systems and is available to the FAA and operators to improve the speed, efficiency and quality of collaborative decision-making. These improvements provide information for all

airspace operators, including UAS, to better plan flights. Net-enabled information sharing improves situational awareness and facilitates the collaborative decision-making process needed to mitigate potential adverse effects of weather, Special Activity Airspace status, and infrastructure status on UAS and other NAS operators.

Data sharing is a key NextGen component – getting the right information to the right people at the right time. This is especially important when it comes to weather information. Common Support Services–Weather (CSS-Wx) will provide the FAA and NAS users with same-time access to a unified aviation weather picture via the SWIM network. This will enable collaborative and dynamic decision making among all users of the NAS, and give them the flexibility to proactively plan and execute aviation operations ahead of weather impacts. Consumers will include public, commercial and general aviation users such as UAS operators.

The William J. Hughes Technical Center

The FAA Technical Center has served as the core facility for modernizing the air traffic management system, and for advancing programs to enhance aviation safety, efficiency, and capacity since 1958. The Technical Center is the nation's premier air transportation system laboratory. The Technical Center's highly technical and diverse workforce conducts research and development, test and evaluation, verification and validation, sustainment, and ultimately, de-commissioning of the FAA's full spectrum of aviation systems. They develop scientific solutions to current and future air transportation safety, efficiency, and capacity challenges. Technical Center engineers, scientists, mathematicians, and technical experts utilize a robust, one-of-a-kind, world-class laboratory environment to identify integrated system solutions for the modernization and sustainment of the NAS and for developing and integrating NextGen

operational capabilities. ADS-B, ERAM and DataComm were all developed, tested and began their nation-wide deployment at the Technical Center through its engineering, testing, evaluation, and deployment platforms.

There is no facility like this anywhere in the world - replicating the entire NAS under one roof, with the capability to support not only NextGen, but all aviation systems through their complete life cycle. The Technical Center's areas of focus include air traffic management, communications, navigation, surveillance, aeronautical information, weather, human factors, airports and aircraft safety. The Technical Center also provides 24-hour, daily operational support to FAA field facilities all over the country. Technical Center specialists diagnose and correct problems so that critical systems remain operational. The Technical Center also actively engages with controllers, and other labor partners, to ensure both the legacy and new equipment successfully perform in the real-world. In addition, the Technical Center provides strategic direction to the agency's Research, Engineering and Development portfolio and ensures that it is integrated, well planned, budgeted and executed.

Successful Technical Center efforts have an impact across the country and indeed, around the world. The Center has assumed a leadership role in promoting international interoperability and global harmonization, through standards and technical guidance to other countries. The Technical Center has contributed to aviation safety in countless ways. Some unique Technical Center laboratories include: air traffic management and simulation facilities, a human factors laboratory, the NextGen Integration and Evaluation Capability, a Cockpit Simulation Facility, a fleet of specially-instrumented in-flight test aircraft, the world's largest full-scale aviation fire test facility, a chemistry laboratory for analyzing the toxicity of materials involved in a fire,

surveillance test laboratories, a full-scale aircraft structural test evaluation and research facility, the National Airport Pavement Test Facility, and a UAS research and development simulation laboratory.

The Technical Center has led the way for the development of critical safety systems. Technical Center employees, working with industry, developed seats that can withstand 16 times the force of gravity and remain anchored to the floor in the event of an accident. These seats are now an industry standard, as are heat-resistant evacuation slides, in-floor and emergency exit lighting and fire resistant voice and cockpit recorders. Advancements in flammability standards both inside the aircraft and in the insulation, with fire-blocked seats and low-heat-release panels, also provide passengers extra time to escape in the event of an emergency. All of these critical safety mechanisms stemmed from research at the Technical Center. The Technical Center also developed and fielded a soft-ground arresting system that provides a nondestructive means for decelerating an aircraft that would otherwise be unable to stop safely within the confines of the runway, including the safety or overrun area. The Technical Center is also currently involved in research to improve the safe transportation of lithium batteries. This research directly supports and advances the position of the U.S. delegation on the ICAO Dangerous Goods Panel, which develops international standards for the safe transportation of all hazardous materials.

Much of the work performed at the Technical Center is in partnership with private industry, academic institutions, other agencies such as NASA and the Department of Defense, and international organizations. The Department of Homeland Security and military entities also have space at the Technical Center. It is the home of the Federal Air Marshal Service training program and the Transportation Security Laboratory, which is the test and evaluation site for

new, advanced airport security technologies. The U.S. Coast Guard Group Air Station Atlantic City, the U.S. Marshal Service, and the New Jersey Air National Guard 177th Fighter Wing are also based at the Technical Center. The Atlantic City International Airport is also on the Center's 5,000-acre campus. These other entities help to create a synergistic aviation-centered site that is without rival anywhere in the world.

The Path Ahead

The Technical Center will continue to play a critical role in aviation safety as technology continues to evolve. The aviation industry is marked by constant evolution and there will always be a need for research and evolving technology in response to changes in aviation needs. We are committed to ensuring that America continues to lead the world in the development and implementation of aviation technology and to operate the safest and most efficient aviation system in the world.

Mr. Chairman, this concludes our prepared remarks. We would be pleased to answer any questions you may have.

THE TESTIMONY OF PETER F. DUMONT, PRESIDENT AND CEO OF THE AIR TRAFFIC CONTROL ASSOCIATION BEFORE THE COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE, SUBCOMMITTEE ON AVIATION, MOVING NEXTGEN FORWARD: LEVERAGING THE ASSETS OF THE WILLIAM J. HUGHES TECHNICAL CENTER. March 11, 2014

I am here representing the Air Traffic Control Association (ATCA), which has had a long relationship with the William J. Hughes Technical Center (Tech Center). We are a professional association, established in 1956 in Washington, D.C., by a group of air traffic controllers at what is now known as Ronald Reagan Washington National Airport. ATCA is dedicated to promoting the science of air traffic control (ATC) and the preservation of aviation safety.

ATCA has a membership of over 3,000 from every aspect of the domestic and international aviation community – air traffic controllers, government employees, researchers, scientists, pilots, academics, students, airlines, as well as representatives of the leading companies in the field. Some of our members can be found right here in Atlantic City working for and on behalf of the FAA.

We have three large events a year: an Annual Conference and Exposition in the Washington, D.C. area (that we have held for nearly 60 years); the World ATM Congress, an international exposition and conference in Madrid; and the ATCA Technical Symposium held each May right here in Atlantic City. NASA and FAA serve as technical co-chairs of the Symposium. It affords the opportunity for people to see, hear, and experience the important work that goes on here.

We also hold more specific and focused symposia throughout the year on subjects like budget, unmanned aerial systems (UAS), cyber security in the National Airspace System (NAS), and civil/military ATC. These are normally in response to the needs and desires of our members and the aviation community.

ATCA publishes both *The ATCA Quarterly,* a blind peer reviewed scientific publication, and a quarterly technical magazine, *The Journal of Air Traffic Control.* ***(Copies have been provided with the testimony.)*** Our current issue of the Journal has articles on privatization and user fees, as well as sense and avoid technology for UAS.

In addition to publishing and staging programs that enhance dialogue between ATC stakeholders, ATCA has both an award program and a scholarship foundation. The awards recognize exemplary research and accomplishments in the field. The ATCA Scholarship Fund awards more than $75,000 in scholarships annually to help students achieve their goals in aeronautical and STEM-related pursuits.

At the heart of all ATCA's activities is the mission to promote the science of ATC and advance the safety and efficiency of aviation. The challenges of aviation today cannot be tackled by

one organization or by the government alone. We have learned that the most effective solutions come from collaboration between government, academia, users, and industry. The Tech Center embraces collaboration; in that spirit, ATCA has worked with the Tech Center for the past 50 years in an effort to improve our aviation system.

The Tech Center's Capabilities in NextGen Development

The FAA Tech Center is a state of the art facility with world-class scientists, technicians and technologies. I am here today to discuss the Tech Center's importance to aviation and ATCA, as well as ways we can leverage its assets.

ATCA members have long turned to the Tech Center to partner in developing new approaches to keep the air traffic system safe and efficient as demands on the aviation system increase and as the NAS transforms. When stakeholders understand better what the Center has to offer, they will see opportunities to support those efforts.

The FAA has recently appointed a new Assistant Administrator for NextGen: Mr. Edward Bolton. Along with this appointment the aviation community expects that a needed strategic reorganization of the NextGen office will occur. The Tech Center is a very important piece of the NextGen solution that should be considered carefully when crafting any organizational changes. It has always been the FAA's hidden gem, sometimes underutilized and not always getting the attention that a prestigious facility with so much capability should receive.

Only in his position a few months, Mr. Bolton has already visited the Tech Center four times, the first after only two days. We think he understands the importance of the Center and its value to the success of NextGen. In fact, he recently used an aircraft simulator there to ready himself for an Airbus familiarization flight in preparation for attending a NextGen Advisory Committee (NAC) meeting. With your visit today, you can also attest to the vast and varied resources and experts here.

I would recommend that all senior FAA management visit the Tech Center periodically. Sometimes, we have to get out of our daily tasks to see the broader mission and the capabilities of our counterparts; making sure that FAA managers visit the Tech Center will in turn raise the awareness of this resource within the entire Agency and help leverage this facility to continue improving aviation.

The Tech Center has state of the art laboratories, talented people, experience, processes and technology to support the research and development, verification and validation, implementation, and ongoing maintenance of the next generation air traffic system. The Tech Center provides the facility and people to bridge an idea from paper to product and from concept to near operational deployment.

One key feature of the Tech Center is that it has one of every piece of equipment currently deployed and operational in the NAS. This seems logical, and on the surface not too consequential, but when you consider all of the different components that make up today's ATC system the value becomes readily apparent. As we begin transformation we must incorporate new procedures and

new technologies into the existing system. You do not turn off the current NAS at midnight and turn on the new system at 12:01. There is a transition period where new and old technologies and procedures coexist.

Introduction of technology occurs in a waterfall. A priority is established where certain facilities and airborne platforms (aircraft) receive the new equipment before others and the refresh flows down until the entire system is transformed.

During the waterfall it is important that we do not introduce technologies or procedures into the NAS that have an adverse effect on other operational systems. The benefit of having all the varying pieces of equipment at the Tech Center is the ability to test, evaluate, verify and validate that the new system performs against specification as well as integrates with the multitude of current systems. The pieces of equipment are not just standalone or siloed – they are connected. If the validation and verification is done in the field, it could jeopardize public safety in a catastrophic way.

Technology and procedures, facilities, and aircraft do not create the whole picture. The NAS is a system of systems and one of the components is the human. The equipment has to be developed with the operator and end user in mind – sometimes referred to as "human in the loop." A solution that controllers or pilots can't use, or makes them less efficient, or worse yet – reduces safety – is not a solution at all. The Tech Center's ability to evaluate human factors is unparalleled.

So how does the Tech Center test all the different elements to ensure they operate as advertised (against specification) and interact with current operational systems? One way is with the NextGen Integration and Evaluation Capability (NIEC).

The NIEC leverages existing NAS operational systems and high fidelity, real-time simulation capabilities to create an integrated, flexible, and reconfigurable environment that can be tailored for NextGen research as well as test and evaluation. The NIEC Display Area (NDA) provides a futuristic NextGen gate-to-gate visualization environment with advanced data collection capabilities to support integration and evaluation of new technologies and concepts. The ability to provide a combined environment of legacy systems with future technologies and capabilities also enables the NIEC to support the transition to NextGen.

The NDA collocates and integrates key air traffic components into a single environment at the Technical Center to address emergent research questions. Existing Center capabilities were leveraged for initial NIEC operation. Additional NextGen capabilities will also be obtained through partnerships with federal agencies, industry and academia. The NIEC platform continues to evolve as research requirements emerge. The potential of this resource is tremendous and, utilized to its full potential, can do much to speed NextGen implementation in a safe and sound manner.

The NIEC is a perfect example of how the Tech Center can move NextGen forward more efficiently than can be done in the field. It is capable of supporting human-in-the-loop testing for both controllers and pilots on multiple systems simultaneously. It simulates the current system and shows us how the changes we make with NextGen will affect the entire NAS. It has the capability to record audio, video, and data for more detailed analyses. The lab can be used 24 hours a day. This is

significant because in the field, air traffic ebbs and flows. You can only test the system at max capacity a couple times a day for a limited period of time. This increase in air traffic is called "the push." The advantage of an around-the-clock lab is that you can simulate the push anytime for as long as you wish. You can also access the lab from outside of the facility. This means that you can collaborate in the NIEC in real time with multiple participants regardless of their location.

The capabilities here will always be relevant because the nature of the NAS dictates that there will continue to be multiple versions of systems operating. Their unique ability to test the impact of NAS transformation on all these components at one time in one facility is the essence of what makes it such a valuable tool for leveraging NextGen implementation.

Another point that should be made clear is NextGen is not an effort with a final "on switch" that is thrown at completion. There are many phases of a project this large and comprehensive. As I indicated earlier it is a transitional transformation occurring incrementally. NextGen – like the current antiquated systems and procedures – is an entity that requires care and feeding. It will continue to be tweaked forever. As we develop new procedures and technologies they will continue to require integration. It is unlikely, but should we reach a stage where NextGen is fully implemented throughout the NAS with no pending upgrades, it will still require maintenance.

Sometimes we think of NextGen as a refresh of old technology or just as procedural changes. The things we often overlook are the new platforms that are being introduced into the NAS at a rapidly increasing rate; one is the pressing need to safely integrate UAS into the NAS. UAS use will create jobs and fuel our economy. Industry, government, and academic collaboration will be key to addressing the challenges surrounding this issue. UAS implementation and integration is the most difficult platform introduction into the NAS we have ever attempted. It requires a whole new way of thinking, new procedures, regulations, and technology. The FAA recently released the location of the six UAS test sites around the country. This is very encouraging because for all of the things we do know, there is much we do not know.

One of the biggest obstacles to advancement of new technology and new ways of operating is big data. Big data is the phenomenon of having too much data to assimilate and analyze in time for it to be useful. This is a possible problem with the UAS test sites. One of the ways we can and should leverage the Tech Center is to use it as a collection point for all UAS test site data. The Center has all the required people, processes, and technology to manage big data and perform verification and validation.

There are so many different types of UAS and so many different missions and business models that a central location for the collection, collation, analysis, and results reporting must be managed by one central clearing house. This will enable collaboration and avoid the sites becoming silos. This big data capability directly capitalizes on the Tech Center's talents and moves NextGen forward significantly and deliberately.

A body of work related to UAS already exists at the Tech Center – this was the result of industry and government collaborating. The FAA signed a cooperative research and development agreement with Insitu Inc., and the New Jersey Air National Guard to study and address UAS integration into

the NAS. Insitu Inc., a subsidiary of The Boeing Company, provided two ScanEagle aircraft and their related support hardware and data to the FAA for two years. The research was managed by the FAA's Research and Technology Development office and conducted at the Technical Center. The two-year agreement enabled FAA scientists to study and better understand UAS design, construction, and functionality. The collection of data from the national test sites is a logical extension of this work.

UAS is just one piece of the puzzle, as there are many platforms and systems that will need development and testing before integrating into the NAS. Two additional examples are Datacom and ADSB. Datacom will provide an end-to-end communication system including leveraging existing equipment on commercial aircraft for air-to-ground voice and data communication. In the case of Datacom, development and integration required end-to-end testing using NAS technology, aircraft, and controllers. As you can imagine, controllers and airlines don't want to beta test something in a live environment where lives are at stake. The Tech Center is the only place in the world where industry and FAA can test systems in a fully simulated environment.

For other opportunities to use the Tech Center, we can look at the current recommendations for NextGen implementation priorities as outlined by the NextGen Advisory Committee (NAC). The Tech Center is the most logical place to test and evaluate NAC priorities with existing facilities and airborne platforms. The tier 1A (high benefit, high readiness – to be completed regardless of budgets) recommendations are:

- Performance Based Navigation (PBN)
- Closely Spaced Parallel Operations (CSPO)
- Surface Operations –Data Sharing
- Time-Based Flow Management (TBFM)
- Wake Recategorization
- Optimization of Airspace & Procedures in the Metroplex (OAPM)

We have also seen that new technology alone does not produce benefits to the users; workable policies and procedures must be in place to assure success. The Tech Center has the ability not only to test the technologies on the ground, in the ATC System, and with the aircraft; but also has the expertise to help develop the policies and procedures for full implementation.

That brings me to the point of collaboration. With all the capabilities of the Tech Center you cannot move NextGen forward in a bubble. No one entity can or should do it alone. We have seen instances in the FAA where new systems or procedures were developed without all of the necessary stakeholder involvement. This resulted in "false starts" that delayed implementation and cost much more than originally budgeted.

Collaboration Between the Tech Center, Aviation Stakeholders, and ATCA

Today's aviation challenges are too complicated, expansive, and costly to overcome in an isolated laboratory – collaboration with stakeholders is key to finding solutions. We applaud the Tech Center when they engage in joint efforts with industry and academia, however, the results still need to be shared with the larger aviation community.

ATCA has worked in many ways to access the talent and the research done here. The problem with a hidden gem is no one benefits from the work done unless they know about it. Communication and collaboration avoids duplication of efforts and leverages best practices and lessons learned that exist inside as well as outside of government. Better communication regarding the work underway here will go a long way to improve leveraging results.

ATCA's membership first met in Atlantic City in 1964 when the Tech Center was known as the Atlantic City Systems Research and Development Facility. We have continued that relationship for the past 50 years, most recently by holding the Annual ATCA Technical Symposium.

ATCA provides a neutral platform for the entire aviation community, focusing on the latest research, products, and services in air traffic control with more than 500 participants from industry, controllers, airlines, NASA, members of academia, and the FAA. Chairman Lobiondo has attended and spoken at the event in the past. Discussion with the government and their industry partners highlight lessons learned as well as current struggles with new technology. ***Every significant air traffic challenge the aviation industry has faced in the last 58 years has been discussed and debated at ATCA symposiums.***

Last year we brought attendees from the Symposium directly to the Tech Center – many for the first time. They heard about and saw the wide range of research that is underway here. The full scope of activities was a surprise even to some who had been involved in the industry for many years. ATCA's Symposium is for us the most efficient, cost-effective, and structured way to educate the industry on the facilities and expertise at the Tech Center. This event is key for FAA and industry employees as well as academics because it exposes participants to different aviation research areas, highlighting to a wider audience the broader collection of aviation issues and providing an opportunity for testing the strength of a particular idea or research approach.

This convergence of so many industry stakeholders often results in partnerships that provide the solutions to the most complex issues facing NAS transformation. Open discussions and debates around possible solutions have also highlighted approaches that need additional stakeholder vetting. With so many expert minds in one place it is readily apparent when an idea is ill conceived.

Every year I hear feedback from both government and industry participants who are attending our events that they were surprised at how much they learned about Tech Center capabilities and efforts.

Please don't underestimate the importance and benefits of simply attending and meeting other experts in the aviation field. For a small business, for instance, the three day Symposium can expose you to dozens of possible partners ranging from large companies to universities. These meetings and contacts could take a company months to generate outside of this environment.

Conferences in general have come under increased scrutiny over the last few years. I want to stress the work that gets done at professional symposiums and conferences that organizations like ATCA provide. Our feedback surveys tell us that during the Symposium, participants are able to conduct six months' worth of business and meetings in just a few days. The economic benefit to government and industry is quantifiable. Compare the cost of a three-day conference versus

traveling to 20 meetings. Just the logistics to bring the right people to the table at multiple locations throughout the year is an example of the cost savings.

The Tech Symposium and Technical Exchanges could not happen without the Tech Center. ATCA has worked successfully with past Center directors and we have continued that tradition with Dennis Filler, the current Director. Dennis, in his past roles here, reached out to educational institutions to establish working relationships and encouraged technology transfer efforts. Working with stakeholders is key to leveraging the Tech Center – and Dennis has not only said he supports those relationships– he has implemented them.

The technical exchanges that take place benefit the industry as a whole. Bringing the stakeholders together here enables collaboration that leads to improved NextGen implementation. Simply put, when you come to an ATCA event, you come to work – and the work benefits aviation and NextGen.

Stakeholder Partnerships are Key to the Tech Center's Success:

One of the keys to the Tech Center's success, but even more importantly, to the success of the air traffic system, is the use of partnerships between the FAA, the industry, and academia. The Tech Center is often the hub of these partnerships.

The Tech Center partners with its stakeholders in many ways – through Centers of Excellence (COE); cooperative research agreements; and other contract vehicles. The important feature is that these partnerships pool resources, expertise, and facilities to improve the aviation system.

There are several COE agreements FAA has signed. FAA uses COEs to leverage universities and sometimes industry to help with key research. The Tech Center is intimately involved in these agreements with research occurring both on-site and at academic institutions. These agreements combine the benefits of the best minds and facilities in the field. Projects on advanced material safety; general aviation safety; and air transport noise and emissions are all included in COE agreements.

Embracing these partnerships between the FAA's Technical Center, the users, the technology industry, and academia is another way to leverage the resources found here. Under these partnership agreements, we pull together a powerful aviation team to solve our toughest issues. By the same token, the COEs leverage technical expertise and facilities located elsewhere to maximize resources for solving our pressing aviation challenges.

Conclusion:

ATCA will continue to work with the Tech Center during our annual Technical Symposium. However, even an intense three-day event cannot summarize the annual activities and accomplishments from this impressive 5,000-acre facility. The resources of our membership are always available to support the many success stories here at the Tech Center.

Thank you for holding this hearing and highlighting the aviation facilities and experts in Atlantic City – it has offered insight into the Tech Center's capabilities for a different audience. As NextGen ramps up, technology must be scalable; larger workload is an inevitable consequence of the continuing rapid developments across all of aviation. Additional support and expansion along with maximum leverage of what, in my view, is an underutilized facility will be key to successful and, most importantly, safe implementation. I will be happy to answer any questions you might have.

Written Testimony by
Cynthia Castillo
Chief Executive Officer and President of CSSI, Inc.
before the
House Transportation and Infrastructure Committee
Subcommittee on Aviation
March 11, 2014

Good afternoon. I would like to thank Chairman LoBiondo and members of the Subcommittee for the opportunity to testify on the subject of "Modernizing the Aviation System: Leveraging the Assets of the William J. Hughes Technical Center." CSSI, Inc. has worked with the Federal Aviation Administration (FAA) for the last 23 years and is honored to be recognized by this committee to represent our industry and its dedication to improving what is already recognized as the best aviation system in the world. CSSI credits its prominent industry status to employees, partners, academic relationships and customers, whose unique blend of academic knowledge, technical skills and operational experience have directly supported the Technical Center's pivotal role in the FAA's efforts to modernize the National Airspace System (NAS).

CSSI works with government and commercial clients to ensure that transportation systems are designed and equipped to safely and efficiently move people and materials. Leveraging deep roots in aviation, CSSI pioneers innovative analytics and best practices that increase capacity, improve reliability and maximize safety. We employ nearly 300 professionals, have offices in five locations and support clients throughout the United States and globally.

CSSI has participated first-hand in the evolution of the aviation industry over the last two decades. We've identified or instituted more than 140 operational improvements from our voluntary safety reporting programs. We've continued to improve the prospects of safe aviation travels with newer, stronger safety standards, and we've helped thousands of aircraft meet Reduced Vertical Separation Minimum (RVSM) certification requirements, thus maximizing airspace capacity, reducing fuel burn and saving millions of dollars in fuel costs. In addition, we drive research, test and evaluation efforts to identify how Unmanned

Aircraft Systems (UAS) can be safely integrated into the NAS, and we've supported NextGen initiatives that cut flight miles and increase fuel savings.

While we work with a number of organizations located at FAA headquarters in Washington, DC, as well as with FAA service areas and field facilities throughout the country, the Technical Center is one of our key partners. By working together, we help the FAA maintain the safest and most efficient aviation system in the world. A great deal of our work with the Technical Center directly contributes to aviation modernization efforts and drives results in three key areas: safety, UAS, and the Next Generation Air Transportation System or NextGen.

Improving Aviation Safety

Safety is the aviation industry's top priority and improvement initiatives are prevalent throughout all modernization efforts. It is critical to ensure that the United States continues to set the gold standard for aviation safety; an achievement which would not be possible without the dedication and collaboration of regulators, manufacturers, air traffic controllers, pilots, flight attendants and maintenance professionals.

Through the years, CSSI has fostered the development of safety management systems that enforce newer and stronger standards for managing safety risk and accountability and minimize the risk of safety incidents occurring. We have developed, enhanced and automated safety reporting processes to gain efficiencies, improved the use of information, and implemented easy-to-use web-based tools. We have developed or contributed to non-punitive safety reporting programs such as the Air Traffic Safety Action Program (ATSAP), Technical Operations Safety Action Program (T-SAP), and the Confidential Information Sharing Program (CISP). ATSAP, for example, provides a qualitative understanding of risk in the NAS and aids in the identification of hazards; as a result, it creates the opportunity to prevent risks in a developing and changing system before an active failure occurs in the aviation safety net. To date, over 70 percent of air traffic controllers use ATSAP and more than 70,000 safety event reports have been collected.

A cornerstone of CSSI's aviation safety work at the Technical Center is the development and implementation of global and regional separation standards, and the associated communication, navigation, and surveillance and air traffic management performance-based standards. As the performance of airborne and ground systems improves, the safe reduction in separation between aircraft provides additional capacity, more efficient operations and increased use of optimized, or user-preferred, flight profiles. We work with the International Civil Aviation Organization (ICAO), the North American Aircraft Approvals Registry and Monitoring Organization (NAARMO) and the Pacific Aircraft Monitoring Agency (PARMO) in every step of the international standardization process.

CSSI's work in separation standards includes the successful December 2013 implementation of reduced lateral and longitudinal separation in the New York Oceanic Flight Information Region for specific types of aircraft. In addition, as part of the North Atlantic Data Link Mandate, we've enabled an increase in the percentage of flights using future air navigation systems and text-message-like communications between pilots and controllers, where before there was only antiquated, high-frequency voice communication, thus enhancing operational safety in the North Atlantic.

Safe Integration of Unmanned Aircraft Systems into the NAS

The NAS is evolving rapidly as NextGen initiatives are refined and merged into current operations. The integration of UAS into the nation's airspace is a major challenge for both the FAA and the aviation community and introduces a new layer of complexity to this evolutionary process. The FAA's unwavering commitment to safety demands that technical support services understand UAS operations and new technologies, but remain focused on this important objective. CSSI works closely with the Technical Center to bring a real world perspective to modeling and simulation scenarios that emulate this complex air traffic control environment. This perspective is essential to the development of UAS operational concepts for testing and integration into the NAS. CSSI brings experience from former air traffic controllers and combines it with an understanding of new technologies. These skills and

knowledge help develop and evaluate realistic human-in-the-loop simulations of the manned and unmanned air traffic control environment. We use the lessons learned from these simulations to revise the simulation's event timing and to verify both communication workloads between the controller and UAS as well as trajectory based interactions between UAS and manned aircraft. The simulations can then be relied upon as accurately characterizing the workloads expected in a NextGen Air Route Traffic Control Centers (ARTCC) environment.

CSSI has played an important role in the development of operational requirements for integration of UAS into the NAS. We continue to refine these requirements for integration of smaller unmanned aircraft. In order to develop these requirements, we determine if a UAS would be able to enter the NAS from specific types of airspace and locations and help develop the operational scenarios that accurately portray UAS interactions with the air traffic management system. To make the models and simulations more accurate, we take into account all stakeholder and operator perspectives including weather conditions, pilots, air traffic controllers and system engineers. We will continue supporting the simulation development and evaluation process to achieve safe integration of UAS into the NAS. We will gauge our success through corroboration with stakeholders and by measuring the results against FAA-accepted safety and performance criteria. We will also continue to support and participate in UAS working groups across the various Tech Center lines of business to realize UAS integration and development of mid-term operational concepts.

CSSI is also an active participant in RTCA's Special Committee 228, Minimum Operational Performance Standards for Unmanned Aircraft Systems. This committee was established in May 2013 and works to develop the minimum operational performance standards for detect and avoid equipment, emphasizing an initial phase of standards development on civil UAS equipped to operate in Class A airspace under regulations governing all aspects of civil aviation aircraft operations.

Implementation of the Next Generation Air Transportation System

Maximizing the safe and efficient use of airspace and airports is critical to accommodating future aviation demand. The aviation industry is working hard to meet forecasted demand, which the FAA predicts will meet or exceed one billion passengers by 2015. CSSI has been a key industry partner in meeting this challenge by working closely with the Technical Center in support of NextGen concepts. Highlights of our work include hypothesizing solutions to airport capacity challenges and driving smart investments and decision-making; testing and implementing pilot projects under the Runway Incursion Reduction Program; and optimizing airspace and procedures in the metroplex in eight out of a targeted 21 regions.

Reducing runway incursions is one of the FAA's top priorities. Through infrastructure improvements and new technologies, we can work to further reduce incursions and increase airfield safety. CSSI uses airport simulation models to replicate the movement of aircraft, runway operations and air traffic control actions. We analyze these models to determine arrival and departure flow rates, travel times, delays, runway usage, occupancy times, fuel consumption and NAS performance metrics. This includes evaluation and development of various simulation models such as the Airport Delay Simulation Model, Runway Delay Simulation Model and FAA's Airport and Airspace Simulation Model. Under the Runway Incursion Reduction Program, we have also tested and implemented pilot projects designed to increase safety of operation in runway areas which tend to experience the most safety incidences due to proximity of aircraft and ground vehicles.

In response to recommendations from the aviation community through RTCA's NextGen Mid-Term Implementation Task Force, the FAA is implementing integrated NextGen capabilities to improve air traffic flow for an entire region, or metroplex. The FAA has identified 21 metroplexes that include several proximate commercial and general aviation airports serving large metropolitan areas. By optimizing airspace and procedures in the metroplex, the FAA provides solutions on a regional scale, rather than focusing on a single airport or set of procedures. The Optimization of Airspace and Procedures in the

Metroplex (OAPM) takes into account all airports and airspace that support each metropolitan area as well as how air traffic in those areas interacts with other metroplexes. It considers a myriad of factors including safety, efficiency, capacity, access and environmental impact.

Through our work on OAPM, we have optimized airspace procedures and structures that increase capacity and efficiency while maintaining safety in eight large metroplex areas, including the development of new performance-based navigation (PBN) procedures in those eight metroplexes. We are currently working on 10 more metroplex areas that are in various stages of completion. We ask air traffic controllers at associated airports to test new PBN procedures to ensure operational success in a real-time environment.

Additional Efforts that Leverage Assets of the William J. Hughes Technical Center in Aviation Modernization

At CSSI, we have been fortunate to provide assistance and technical expertise on other less well-known yet equally impactful projects that directly support aviation modernization efforts, including those of particular concern to air traffic controllers. One such project is the Wildlife Surveillance Concept, which examines how to integrate supplemental avian threat information into the air traffic control environment. We are working with pilots, controllers and front-line managers to identify a set of requirements for what avian radar and subsequent integration should look like. The incorporation of avian radar into the air traffic control environment could provide significant safety benefits as well as have positive environmental impacts on wildlife preservation efforts.

In conclusion, the FAA is working tirelessly to modernize what is already the safest and most progressive aviation system in the world. At CSSI, we are proud of how we have partnered with the Technical Center to integrate new technologies into the NAS, all of which will enhance safety, save fuel, reduce delays and increase capacity.

Today, we shared a few key examples of how CSSI, together with the Tech Center, has supported the FAA in advancing NextGen concepts: we have helped improve safety even while introducing more aircraft into the NAS; we are modeling, testing, evaluating simulation scenarios for safe UAS integration; and laying a solid foundation for long-term NextGen success.

Despite all that we have accomplished in partnership with the FAA, we recognize that there is still much work to be done. Government and industry must continue to collaborate closely to achieve key NextGen milestones in the face of tight deadlines and budget challenges – it is imperative for the future of air transportation, and for our nation's economy. This is why it is so very important that the FAA and the Technical Center receive the support they need to stay at the leading edge of aviation technology, and to continue to set the gold standard for the rest of the world.

CSSI looks forward to partnering with the FAA at the Technical Center to achieve aviation modernization and NextGen goals over the next several years. I encourage you to support the important work being done to modernize the U.S. aviation system and ultimately improve the flying experience for the American public.

This concludes my testimony. I would be happy to answer any questions you may have.

National Air Traffic Controllers Association
AFL-CIO

Testimony of

National Air Traffic Controllers Association

Before the

House Transportation and Infrastructure

Subcommittee on Aviation

March 11th 2014

"Moving NextGen Forward: Leveraging the Assets of the FAA's [Federal Aviation Administration] William J. Hughes Technical Center."

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Introduction
The National Air Traffic Controllers Association (NATCA) is the exclusive representative of over 14,200 air traffic controllers serving the Federal Aviation Administration (FAA), the Department of Defense (DOD) and the private sector. In addition, NATCA represents FAA's Alaska flight service specialists, FAA engineers, traffic management coordinators, aircraft certification professionals, agency operational support staff, regional personnel from FAA's logistics, budget, finance and computer specialist divisions, as well as agency occupational health specialists, nurses and medical program specialists.

Air traffic controllers are dedicated to ensuring that our National Airspace System (NAS) is the safest and most efficient in the world. In order to maintain that safety and efficiency, our controllers work to improve safety procedures, modernize the NAS and promote new technology. We have professional controllers involved in nearly every modernization and NextGen-related program the FAA is currently working on. Controller skills are put to work every day as they handle an impressive volume of flights – air traffic controllers separate more than 70,000 flights each day, safely moving nearly two million passengers through our skies daily. Air traffic controllers handle these flights in the busiest and most complex airspace in the world with roughly 5,000 planes in the sky at any given moment.

Next Generation Air Traffic Control System (NextGen)
The Next Generation Air Transportation System (NextGen) is the FAA's effort to modernize the nation's air traffic control system. NATCA fully supports NextGen modernization, which will allow the FAA to meet increased demand while improving the safety of the NAS, reducing delays, and protecting the environment. According to the FAA's vision, NextGen will enable more aircraft to safely fly closer together on more direct routes, reducing delays, carbon emissions, fuel consumption and noise.

NextGen will transform the national air transportation system using new and existing technologies including satellite navigation and control of aircraft, advanced digital communications, and enhanced connectivity between all components of the NAS.

NATCA is proud to be involved in all aspects of the process as an essential stakeholder. NATCA and the FAA both recognize that stakeholder involvement is the key to continued success to NextGen. In addition to being present on NextGen projects, NATCA is represented as a member of the Radio Technical Commission for Aeronautics (RTCA), the FAA Management Advisory Council (MAC), and the NextGen Advisory Committee. Our presence, as well as that of industry leaders, has been an important addition to the discussion on modernization.

The William J. Hughes Technical Center
Since 1958, the William J. Hughes Technical Center has served as the core facility for modernizing the air traffic management system, and for advancing programs to enhance aviation safety, efficiency, and capacity. Approximately 1,500 FAA employees work at the Technical Center, with another 1,500 contractor employees and 1,000 non-FAA tenants based on site.

The Technical Center's areas of focus include air traffic management, communications, navigation, surveillance, aeronautical information, weather, human factors, and airports and aircraft safety. The Technical Center also provides 24-hour, daily operational support to FAA field facilities all over the country. Technical Center specialists diagnose and correct problems so that critical systems remain operational. In addition, the Technical Center provides strategic direction to the corporate research, engineering, and development portfolio and ensures that it is integrated, well planned, budgeted and executed.

Some unique Technical Center laboratories include: air traffic management and simulation facilities, a human factors laboratory, the NextGen Integration and Evaluation Capability, a Cockpit Simulation Facility, a fleet of specially-instrumented in-flight testing aircraft, the world's largest full-scale aviation fire test facility, a chemistry laboratory for analyzing the toxicity of materials involved in a fire, surveillance test laboratories, a full-scale aircraft structural test evaluation and research facility, and the National Airport Pavement Test Facility. In addition, the Technical Center manages the FAA off-site test bed located at the Embry-Riddle Daytona Beach campus.

Why is the Technical Center important for NextGen?
NATCA is a strong supporter of the Technical Center, and we look at it as a facility to research, develop, and test new systems related to NextGen modernization. The WJHTC is the only place in the country where current NAS systems can be tested alongside new technologies. To facilitate that testing, the WJHTC has technologies and equipment, expert maintainers, engineers and scientists intimately familiar with the structure and operation of those technologies and equipment. The WJHTC also offers a unique advantage for private companies who work with the federal government to develop these new technologies – thanks to the guarantees and protections provided by the government, individual vendors and their staff are able to interact with each other and government employees while protecting their intellectual and technological property rights. The umbrella effect of these policies enables individual experts from various domains to identify and solve complex problems with sometime obscure system integration issues quickly and effectively.

Successful deployment of NAS modernization requires a balanced approach comprised of healthy dialog between the vendors providing technology enhancements, the Technical Center personnel that shepherd the capabilities through the modernization process, and the air traffic controllers who are the "end users" of the technologies and capabilities which will enhance the efficiency of the NAS. These three essential elements (vendors, Technical Center, and end users) must be methodically incorporated into the deployment process. As we have seen in the recent past, under-appreciation for any one of these elements introduces significant risk that will manifest itself as the deployment process progresses. The good news is that well thought-out deployment plans that include these essential elements significantly reduce risks, as displayed in the deployments of near-term NextGen capabilities.

Equipment at the Technical Center
The NAS is comprised of several different systems such as airports, aircraft, and air traffic control systems. Air traffic control is operated by humans and supported by a variety of automation systems. Each of the systems performs a unique task but must cooperate with the other systems to ensure the safe transfer of information. The Technical Center is a national asset that houses a functioning replication of each of these individual subsystems that comprise the NAS. More specifically, the Technical Center is essential for the integration, verification and validation (V&V) and testing of components that make up NextGen.

As NextGen ATC technologies are introduced into the NAS, the WJHTC plays a crucial role. The WJHTC success can be attributed to two main components: people and equipment. The blending of these core components is enhanced by the existence of key government policies that enable a balanced, transparent, safe environment for the entire process of technology enhancements. Since the NAS is a 24-7 operation, required to operate at top levels of safety and efficiency continuously, any changes or enhancements must be exhaustively and methodically tested prior to activation or deployment in the operational environment.

Example: Automatic Dependent Surveillance-Broadcast (ADS-B)
Integration of this NextGen cornerstone technology across multiple automation platforms involves Operational Testing and Evaluation. The WJHTC provides a unique combination of highly skilled personnel and multiple automation platform test beds in one location. Technical Center aircraft have also been essential to testing ADS-B in the field.

Example: Airway Facilities Tower Integration Laboratories (AFTIL)
While not an equipment program, the AFTIL project saves the FAA millions of dollars when constructing air traffic control towers, which are one component of the NAS. Controllers and airport operators are able to simulate the location of new towers before the first shovel of dirt is turned. This provides an efficient and safer operation.

Example: Wake Turbulence Mitigation for Departures (WTMD)
Wake Turbulence Mitigation for Departures (WTMD) is a wake avoidance solution for airports with closely spaced parallel runways that can significantly increase throughput. The equipment integrates input from wind sensor equipment and determines if there is an adequate crosswind to allow controllers to disregard Wake Turbulence separation on certain parallel runways. In use at airports like San Francisco (SFO) and Houston (IAH), it has been very successful in reducing departure delays during those times that the wind conditions are favorable. The equipment used by controllers for WTMD was developed exclusively at the Technical Center by FAA employees who integrated off-the-shelf equipment with wind sensor equipment already in use across the country. This was done at a per-unit price that was considerably less than a contractor could have developed it.

Validation Verification: This modernization step is to assess whether a system (e.g. En Route Automation Modernization (ERAM)) delivered by a private contractor like Lockheed, meets the specifications required by the FAA. When moving from a concept to a product, the government selects a contractor to produce a product that will eventually become another component of the NAS. For that to happen, the federal government must define requirements and guidelines for the

project. The vendor will produce a product they feel meets the requirements and deliver the product to the federal government. The Technical Center is used to evaluate whether the product meets the original specifications. The Technical Center is essential because they have the ability to determine whether systems from different vendors are compatible without fear of patent issues – thanks to the protections offered by the federal government, transparency and disclosure take place at the Technical Center, allowing systems to be verified and validated without fear of competition. When a vendor delivers a product to the government it is the first opportunity to see how the product functions and what the potential integrations issues may be. As an example, the first version of ERAM and Terminal Automation Modernization and Replacement (TAMR) were tested at the Technical Center to see if they could interact successfully together.

People At the Technical Center

Test and Evaluation: Another phase of procurement is the testing and evaluation of new products. The Technical Center is able to replicate an operational air traffic facility in a laboratory environment where testing and evaluation can take place independent of live traffic. The FAA employs current air traffic controllers and other end-users to test these products in simulated air traffic conditions. This concurrent testing would be impossible to conduct in the NAS while maintaining live traffic.

Example: Terminal Automation Modernization and Replacement (TAMR)

The Technical Center provides invaluable testing and evaluation on all software and equipment that is introduced into the terminal environment. Over the past two years, their involvement and expertise has been pivotal in the successful deployment of Standard Terminal Automation Replacement System (STARS) at Dallas/FortWorth TRACON (D10). Their involvement in the development of software test plans, hardware integration and transition strategies has helped the TAMR program achieve early success. Working in collaboration with NATCA and other labor partners, the Technical Center is a vital cog in the FAA's machine as we move towards NextGen.

Example: Resolving Integration Challenges

The NAS operates daily with multiple, complex automation systems. Each is unique and, as hard as stakeholders try, it is nearly impossible to anticipate every possible ramification when significant changes are introduced. The Technical Center provides a unique environment to recreate problems reported in the operational environment, investigate causes, and research solutions. Without the availability of multiple automation test beds and key personnel in one location, progress towards the multiple facets of NextGen would be significantly hampered.

Human Factors: The air traffic system functions via a complex of interactions humans and machines. One major benefit of the Technical Center is it allows current controllers to be brought in to interact with new machines to assess how they interact. This allows the FAA to determine what, if any, changes need to be made before deployment in the field. This is essential because technology developed by engineers in a vacuum frequently does not interact as expected.

Example: Engineers and Equipment Development
Not only do the employees at the Technical Center evaluate and improve equipment, they also develop it, often producing the same type of equipment for significantly less than contractors.

Example: DataComm
During the concept validation phase of DataComm the WJHTC played a vital role in defining the human machine interface (HMI) of new data communication systems for pilots and controllers. The human factors scientists and laboratories at the WJHTC were uniquely suited to provide an unbiased evaluation of the critical component of the NextGen air traffic capability.

Example: Ground-based Interval Management (GIM-S)
Ground-based Interval Management (GIM-S) is an important application being introduced with high visibility from a number of users that leverages off of ADS-B data. Testing at the Technical Center provides the first opportunity for stakeholders, including NATCA, to evaluate an application that goes beyond concept to reality.

Policies
Integration: NextGen is going to modernize the NAS by bringing in new systems or using current systems in new ways. The Technical Center ensures the smooth integration of these systems so when they move from testing to actual deployment in the field, they will behave as expected. This allows the FAA to work on adding new systems without introducing risk or interrupting the NAS.

Example: Time based flow management (TBFM)
Time Based Flow Management (TBFM) is a significant shift within air traffic control from the use of miles-in-trail to the use of time slots to smooth the peak demand periods. This shift in operations requires multiple computing platforms and multiple software systems. The Integration capabilities at the WJHTC provide an opportunity for competing vendors to build effective links between their respective proprietary systems. These systems can be effectively tested during the integration phase prior to operational deployment within the NAS.

Conclusion
The last four years of intensive complex system deployment have revealed fundamental truths across multiple automation platforms. Regardless of the automation platform, ERAM, TAMR, ADS-B, TBFM, DataComm, Advanced Electronic Flight Strips, Terminal Flight Data Manager, NAS Voice System, Automated Terminal Proximity Alert, or programs such as Wake Turbulence Mitigation, one theme connects them all. The role of the Technical Center as both a facilitator and enabler of NAS modernization is essential. The Technical Center is the only place where vendors and current air traffic controllers have the opportunity to interact with FAA experts across all of the domains that make of our National Airspace System. NATCA believes the WJHTC is providing invaluable opportunities at all stages of development, testing, and deployment, and we look forward to continued collaboration and cooperation.

TESTIMONY

BEN GIELOW

ASSOCIATION FOR UNMANNED VEHICLE SYSTEMS INTERNATIONAL (AUVSI)

U.S. House of Representatives
Committee on Transportation and Infrastructure
Subcommittee on Aviation
Hearing: "Moving NextGen Forward: Leveraging the Assets of the FAA's William J. Hughes Technical Center"

March 11, 2014

Chairman LoBiondo, Ranking Member Larsen, Members of the Committee, thank you for the opportunity to speak to you today. I am speaking on behalf of the Association for Unmanned Vehicle Systems International (AUVSI), the world's largest non-profit organization devoted exclusively to advancing the unmanned systems and robotics community. AUVSI has been around for more than 40 years, and we currently have more than 7,000 members, including over 600 corporate members.

As you know, unmanned aircraft systems, or UAS, increase human potential, allowing us to execute dangerous or difficult tasks safely and efficiently. Whether it is helping first responders, advancing scientific research, or making business more efficient, UAS are capable of saving time, saving money, and most importantly, saving lives. However, the benefit of this technology does not stop there; this technology has incredible potential to create jobs and stimulate the U.S. economy as well.

Last year AUVSI released an economic impact study[1] finding that, within the first 10 years following UAS integration, the UAS industry will create approximately 100,000 jobs and have more than $82 billion in economic impact. Because of cost, small UAS, weighing less than 55 pounds, will comprise a majority of the developing commercial market. These small UAS have sufficient capabilities to meet the needs of remote sensing for a variety of commercial markets, including agriculture – which our economic report suggests will comprise 80% of the

[1] www.auvsi.org/econreport

commercial UAS market – inspection, real estate, and journalism. Most operations will be conducted below 500 feet with limited need to fly above 1,500 feet.

However, before these jobs and economic impact become a reality, the FAA must write the safety regulations to integrate these systems. The longer the FAA takes to write those regulations, the greater the risk to aviation safety.

The need for a regulatory framework became evident on March 6th, when a National Transportation Safety Board (NTSB) Administrative Law Judge ruled that FAA has no authority to regulate model aircraft or UAS[2] because the FAA has not yet adopted regulations through formal rulemaking. To date, everything the FAA has published on UAS has been guidance or policy, which is not binding on the public. Although the FAA has already indicated its plan to appeal the decision to the full NTSB[3], staying the decision until the full Board reviews it on appeal, the FAA may also implement emergency rulemaking.

The current pace of UAS integration, specifically with regard to small UAS, is unacceptable. The FAA has been working on rulemaking for small UAS since 2009 and the projected date for a final rule was in 2011. Unfortunately, the FAA does not anticipate releasing the notice of proposed rulemaking for small UAS until this fall, and it is unlikely the rule will be finalized until at least 2015. The longer regulations for small UAS operations are delayed, the more people will be flying in an unregulated manner. The FAA's surveillance and enforcement resources will be severely strained, which poses a threat to aviation safety. We are concerned that if unregulated operations proliferate, the likelihood that something could go wrong increases. If and when that happens, it could set back this revolutionary technology that is advancing faster than the regulatory framework around it.

An option may be for the FAA to use the authority granted to it by Congress in Section 333 of the FAA Modernization and Reform Act[4], which says, "the Secretary of Transportation shall determine if certain unmanned aircraft system may operate safely in the national airspace system before completion of the plan and rulemaking..." The FAA has delegation authority, and perhaps it could enter into agreements with the UAS test sites to do certification work for small UAS aircraft and operators before the small UAS notice of proposed rulemaking is released later this year.[5]

UAS Work at the William J. Hughes Technical Center

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[2] Michael Huerta v. Raphael Pirker, NTSB Docket CP-217
[3] http://www.faa.gov/news/press_releases/news_story.cfm?newsId=15894
[4] http://beta.congress.gov/112/plaws/publ95/PLAW-112publ95.pdf
[5] http://www.dot.gov/regulations/report-on-significant-rulemakings

The FAA's Technical Center can play an invaluable leadership role in collecting and analyzing UAS data to help the FAA write UAS rules; however, the UAS research department at the Technical Center is under-staffed, under-resourced, and its current research is not based on a strategic plan to integrate UAS into the national airspace system. In fact, last month, the Department of Transportation Inspector General found there is an inadequate framework for sharing and analyzing UAS data, and the FAA has no process to ensure that all incidents are reported. AUVSI would like to see a holistic approach to UAS research based on the FAA's roadmap and concept of operations.

Although the FAA's UAS research budget has grown in recent years, from approximately $4 million in 2013 to $8 million in 2014, and possibly $9 million in the President's 2015 budget, there are currently less than five full-time UAS researchers at the Technical Center, not including contractors. The rest of the researchers are on loan from other departments at the Technical Center. This staffing construct is referred to as a "matrix" team. Thus far, all UAS research has been tasked from the UAS Integration Office in FAA's headquarters. AUVSI would like to see the FAA expand its core UAS research team.

Currently, all UAS research at the Technical Center is funded through the FAA's research, engineering and development budget, which provides very little flexibility in how funds can be used. This is different from the FAA's NextGen or operations research budgets, which provide more flexibility in how funds are used. In this research budget, all of FAA's research programs compete against each other on a yearly basis and the final decisions on what program projects gets funded are made by the FAA's Technical Community Representative Group (TCRG); therefore, there is no guarantee of future UAS funding. AUVSI would like to see more UAS projects directly funded through the FAA's NextGen or operation research budgets, which have thus far funded relatively limited UAS research projects.

In 2014, six UAS research projects were initially approved by the TCRG[6], with a total budget of approximately $8 million. Interestingly, none of these projects were intended for UAS test site data management. However, now that the test sites have been selected, the FAA is in need of a location to store and analyze the data, as well as resources to pay for data analysis. Because there is no "new" money in the research budget, the FAA was forced to cancel one of its

[6] The FAA's Technical Community Representative Group approved six UAS research projects for 2014, including:

1) UAS 14-01: SAA System-Certification Considerations for Reqts-Based Testing & Validation of Non-Deterministic Data Processing. This project was funded at approximately $1 million.
    a. NOTE: This project was cancelled and the funding was split and reallocated between two "pop up" projects, which were deemed immediate needs but not budgeted for, including UAS test site data management and the ACAS Ua research project.
2) UAS 14-02: SAA System Multi-Sensor Surveillance Data Fusion Strategies
3) UAS 14-03: SAA System Certification Obstacles
4) UAS 14-04 (C2) Evaluation of Comm Strategies in the Context of UAS Operations
5) UAS14-05: UAS Safety Criteria for Airborne & Ground
6) UAS 14-06: Simulating Oversight of UAS in NAS Operations

approved projects and use part of that amount – $500,000 – to initiate the test site data work. If the FAA is committed to using the test sites to collect and analyze data to help with widespread UAS integration (the goal of the test sites), a half-of-a-million dollars is likely going to be inadequate. In comparison, the FAA has budgeted approximately $1 million toward the stand-up of the yet-to-be-announced UAS Center of Excellence.

According to the FAA, because they were not given money to start up or manage the UAS test sites in the FAA Modernization and Reform Act, or in annual funding bills, they are unable to direct the research work at the test sites. This begs the questions: what type of data will the test sites collect, will everyone be speaking the same data language, where will the data go, how will propriety company information be protected, how will the data be used, and how will duplicative work be avoided?

The FAA hopes to iron out these details when it brings the six sites together at a meeting here at the Technical Center later this month. Hopefully, the sites, along with the FAA, will all agree on a data management plan and outline who will be doing what research. Of note, because the FAA will be funding the yet-to-be-announced Center of Excellence, the FAA will be able to direct specific research at this Center. How this Center of Excellence research and the test site research will harmonize has not yet been determined.

Lastly, AUVSI would like to request the Committee closely monitor the FAA's compliance with section 1087(b) of the 2014 National Defense Authorization Act[7], which requires a report to Congress on the resource requirements needed in order to meet the milestones for UAS integration described in the five-year roadmap. The FAA has until July to issue the report. Without that number, Congress and the UAS industry will not fully understand the resources needed by the FAA to write UAS regulations. If the FAA is unable to meet that deadline, we would suggest the Government Accountability Office be tasked with doing the budget estimate and folding it into one of its ongoing UAS reports.

UAS offer great promise, but before this industry can take off, we need to know the safety rules our members must abide by. For every day the FAA delays integration, the U.S. stands to lose $27 million in economic benefit[8], which is why it is in all of our best interests to help the FAA get the data they need and process it into meaningful regulations. The Technical Center, along with other industry, government, and academia partners are prepared to do to the work.

Thank you again for the opportunity to speak today. I look forward to answering any questions the committee might have.

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[7] http://beta.congress.gov/113/bills/hr3304/BILLS-113hr3304enr.pdf
[8] www.auvsi.org/econreport

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